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OKI
PRINTING SOLUTIONS

C9600/C9800/ES3640 Finisher Maintenance Manual

051108A

INTRODUCTION

Meaning of Symbols

The symbols below are used in this manual.

Symbol	Meaning
	Denotes general caution, warning or danger.
	Denotes caution against electrical shock.
	Denotes caution against fire.
	Denotes prohibition in the case where disassembling the machine may result in electrical shock or other damage.
	Denotes prohibition in the case where the machine must be unplugged before starting a task.

Overview of Manual

This service manual provides basic information necessary for servicing the finisher to maintain its quality and functions.

Each chapter of the manual contains information below.

Chapter 1. Overview:	Features and specification
Chapter 2. Operation:	Operating principles and timing of the mechanical system and electric system classified by function. Electric circuit configuration and its summary
Chapter 3. Parts replacement:	Mechanical configuration and procedures for disassembly, assembly and adjustment
Chapter 4. Maintenance & inspection:	Periodical replacement parts list, expendable parts durability guide list, and periodical servicing list
Chapter 5. Troubleshooting:	Standards, adjustment and troubleshooting, etc.
Appendix:	Overall timing chart, signal name/abbreviation list, overall circuit diagram, etc.

This service manual doesn't contain the installation procedure. The installation guide is enclosed in the package of each machine.

This service manual provides explanations on the basis of rules below.

1. Each chapter summarizes the purpose and role of each function, its relation to electric and mechanical systems, and operation timing of each component and part.

   In the schematic diagrams, the symbol (⊣■■■⊢) represents transmission of mechanical drive. If this symbol is accompanied by an arrow (⟶) and a signal name, the symbol represents the flow of the electricity.

   As used in this manual, "turn on power" means supply power to the machine by turning on the power switch, closing the front door, or closing the paper delivery door.

2. In the explanation of the digital circuits of this machine, "1" represents the high voltage level of the signal and "0" represents the low voltage level. The voltage values differ from circuit to circuit.

   This machine uses a CPU. The explanation of the CPU operation, however, is omitted in the service manual, since it is practically impossible to check the CPU internal operation. Also, the manual provides only the summary of the PCB circuits using block diagrams, because the printed circuit boards are not supposed to be repaired at a customer's place. The circuits explained in this manual include those from the sensors to the inputs on the circuit boards for control and drive, those from the outputs on these circuit boards to loads, and block diagram of each function.

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1. OVERVIEW

1.1 Features

1) Use of Through-Type Stapler
   As a through-type stapler is used, saddle-stitch stapling is available without changing the stapler.

2) Three Auto Staple Functions
   There are three stapling positions (front single, rear single, and center double).

3) Saddle-Stitch Function
   The finisher saddle-stitches or V-folds up to 7 sheets of paper.

4) Punch Function (Optional)
   Using the puncher unit, holes for a binder can be punched in paper (available for paper weighing 65 to 128 g/m^2 and not available for OHP films).

1.2 Specification

1.2.1 Specification

1.2.1.1 Finisher/Saddle-Stitcher Unit

Table 1-01 (1/2)

Item	Specification	Remarks
Stacking method	Stacking in 2 places [1] Descending output tray (1 tray) Face-down/up stacking [2] Fixed booklet tray	
Paper feed reference position	Center	
Stacking paper size	A3, A4-LEF, A4, A5, B4, B5-LEF, B5, A6, 279mm×432mm(11×17), LGL, Exective, LTR-LEF, LTR	Large size: A3, B4, 279 mm × 432 mm (11×17), LGL
Paper weight	Finisher: 65 g/m^2 to 90 g/m^2 Saddle-stitcher: 65 g/m^2 to 80 g/m^2 (65 g/m^2 to 128 g/m^2 (Thick paper: One-sheet is possible only for a cover.))	
Operation mode	Non-sort, Sort, Staple, and Booklet	
Stacking capacity (Note 1)	Non-sort staple Large size: 500 sheets Small size: 1000 sheets (note 2) Staple-sort Large size: 30 sets or 500 sheets Small size: 30 sets or 1000 sheets Booklet 6 to 7 sheets/set: 10 sets 2 to 5 sheets/set: 20 sets	
Stacking of mixed sizes	Mixed sizes: 500 sheets (note 3) Mixed stapling: 30 sets (in the same order)	
Paper detection	Output tray: Available Booklet tray: Available	
Operating unit	N/A	
Display unit	N/A	
Dimensions	636.5 (W) × 603 (D) × 464 (H) mm	The mounting kit is not included.
Weight	Approximately 27 kg	
Power supply	A voltage of 24 VDC is supplied from the inverter.	
Maximum power consumption	Standby: 13 W / During operation: 84 W (staple-sort)	
Stapling method	Driving staples using the rotary cam.	
Stapling position	See Figure 1-01.	
Stapling capacity	Finisher: Large size: 22 sheets Small size: 45 sheets Saddle-stitcher: 7 sheets	80 g/m^2 or equivalent 80 g/m^2 or equivalent 80 g/m^2 or equivalent
Staple loading	Staple cartridge designed for the finisher	
Applicable staple	Staples designed for the finisher (5000 staples)	
Staple empty detection	Available (nearly empty: 40 staples left)	
Paper size for stapling	Front single stapling: A3, A4-LEF, A4, B4, B5-LEF, 279 mm×432 mm (11×17), LGL, LTR-LEF, LTR Rear single stapling: A3, A4-LEF, B4, B5-LEF, Center double stapling: A3, A4-LEF, A4, B4, B5-LEF, 279 mm×432 mm (11×17), LGL, LTR-LEF, LTR Saddle-stitch double stapling: A3, A4, B4, 279 mm×432 mm (11×17), LTR, A4-LEF, B5-LEF, LGL, LTR-LEF	When the saddle-stitcher is used.

Table 1-01 (2/2)

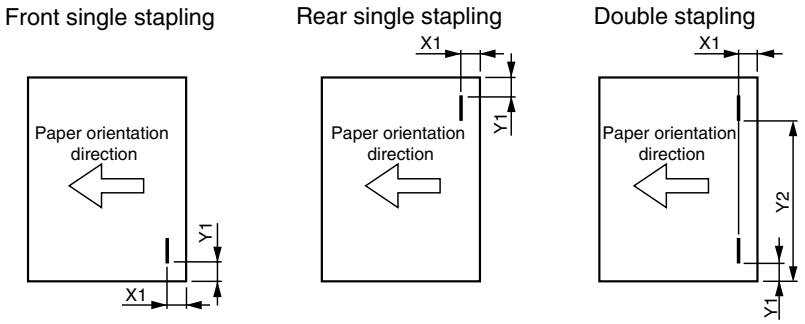
Item	Specification	Remarks
Manual stapling	Not available.	
Folding method	Folding paper by pressing with a roller	
Folding mode	V-folding (with one unstapled sheet)	
Folding position	Paper center	A margin of at least 5 mm each must be left from the center of paper.
Paper size for saddle-stitching	A3, A4, B4, 279mm×432mm(11×17), LTR	Special paper cannot be used.
Model No.	N31240A	

Note 1: The stacking capacity above is a rough estimate using paper weight of 80 g/m^2.

Note 2: When more than 500 sheets are stacked, the stacking registration is not guaranteed.

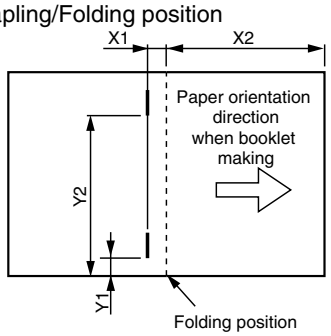
Note 3: When documents of mixed sizes are stacked, the stackability is not guaranteed.

Staple Position



Size	Direction	Front single staple	Rear single staple	Double stapling	Size	Direction	Front single staple	Rear single staple	Double stapling
A3	X1	5.0±2	5.0±2	5.0±2	Exective	X1	5.0±2	5.0±2	5.0±2
	Y1	4.5±2	4.5±2	83±4		Y1	4.5±2	4.5±2	26.6±4
	Y2	—	—	203±4		Y2	—	—	146.6±4
A4-LEF	X1	5.0±2	5.0±2	5.0±2	Ledger	X1	5.0±2	5.0±2	5.0±2
	Y1	4.5±2	4.5±2	83±4		Y1	4.5±2	4.5±2	74.2±4
	Y2	—	—	203±4		Y2	—	—	194.2±4
A4	X1	5.0±2	5.0±2	5.0±2	Legal	X1	5.0±2	5.0±2	5.0±2
	Y1	4.5±2	4.5±2	39.5±4		Y1	4.5±2	4.5±2	42.5±4
	Y2	—	—	159.5±4		Y2	—	—	162.5±4
B4	X1	5.0±2	5.0±2	5.0±2	Letter-LEF	X1	5.0±2	5.0±2	5.0±2
	Y1	4.5±2	4.5±2	63±4		Y1	4.5±2	4.5±2	74.2±4
	Y2	—	—	183±4		Y2	—	—	194.2±4
B5-LEF	X1	5.0±2	5.0±2	5.0±2	Letter	X1	5.0±2	5.0±2	5.0±2
	Y1	4.5±2	4.5±2	63±4		Y1	4.5±2	4.5±2	42.5±4
	Y2	—	—	183±4		Y2	—	—	162.5±4

Stapling/Folding position

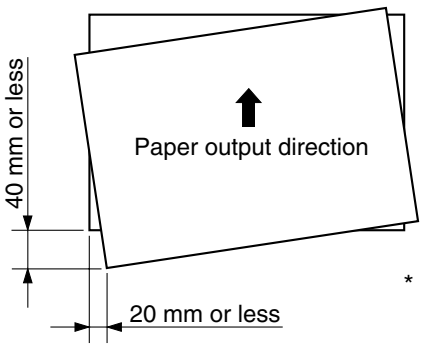


X1±1.5mm (Staple to folding position)
X2±2mm (Top of the paper to folding position)
Y1±4mm
Y2±4mm

Size	X1	X2	Y1	Y2
A3	0	210	83	203
A4	0	148.5	39.5	159.5
B4	0	182	63	183
Ledger	0	215.9	74.2	194.2
Letter	0	139.7	42.5	162.5

Figure 1-01

Stacking Registration



* Measure on the vertical-wall side.

Figure 1-02

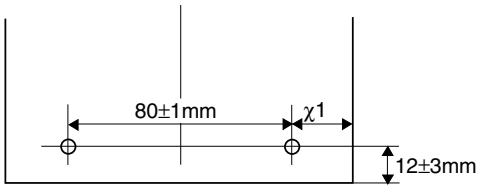
1.2.1.2 Puncher (Optional)

Table 1-02

Item	Specification	Remarks
Punch method	Reciprocating system (punching one by one)	
Paper size	2 holes (puncher unit •2H): A3, A4, A4R, B4, B5, B5R 2 or 3 holes (puncher unit •2/3H): 2 holes for LGL and LTRR 3 holes for 279 mm x 432 mm (11 × 17) and LTR 4 holes (puncher unit •4HF/4HS): A3, A4	
Paper weight	65g/m^2 ~ 128g/m^2	Not available for envelopes, postcards and OHP films
Punch hole diameter	2 holes (puncher unit •2H): 6.5 mm 2 or 3 holes (puncher unit •2/3H): 2 holes / 8.0 mm 3 holes / 8.0 mm 4 holes (puncher unit •4HF/4HS): 6.5 mm	
Punch dust capacity	2 holes (puncher unit •2H): 10,000 sheets 2 or 3 holes (puncher unit •2/3H): 2 holes / 3000 sheets 3 holes / 3000 sheets 4 holes (puncher unit •4HF/4HS): 5000 sheets	80g/m^2 or equivalent
Dimensions	90 (W) × 560 (D) × 170 (H) mm	
Weight	Approximately 2.5 kg	
Power supply	A voltage of 24 VDC is supplied from the finisher unit.	
Power consumption	Standby: 2 W or less During operation: 21 W or less (punching)	
Model No.	N31260A (puncher unit •2H) N31261A (puncher unit •2/3H) N31262A (puncher unit •4HF) N31263A (puncher unit •4HS)	

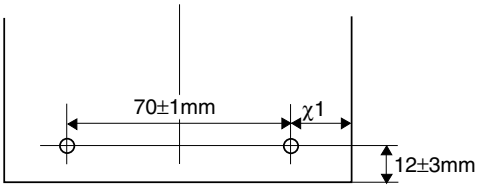
Hole Position

[1] 2 Holes (Puncher Unit •2H)

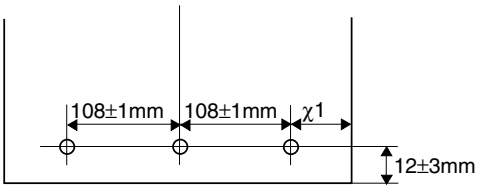


χ1	
A3/A4-LEF	108.5±3mm
Executive	93.35±3mm
B5-LEF/B4	88.5±3mm
A4	65±3mm
B5	51±3mm
Ledger/LTR-LEF	99.5±3mm
LGL/LTR	68±3mm

[2] 2 or 3 Holes (Puncher Unit •2/3H)

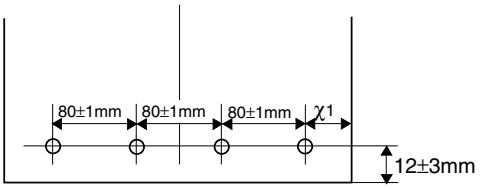


χ1	
LGL/LTR-LEF/ Ledger	73±3mm



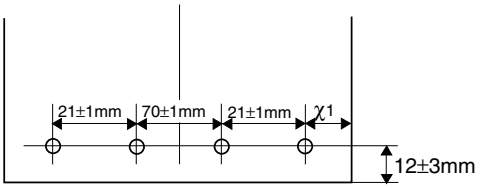
χ1	
279mm × 432mm (11 × 17)/LTR-LEF	31.5±3mm
A3/A4-LEF	40.5±3mm

[3] 4 Holes (Puncher Unit •4HF)



χ1	
A3/A4-LEF	28.5±3mm

[4] 4 Holes (Puncher Unit •4HS)



χ1	
A3/A4-LEF	92.5±3mm
B5-LEF/B4	72.5±3mm
A4	49±3mm
B5	35±3mm
Executive	36.1±3mm
Ledger/LTR-LEF	83.5±3mm
LGL/LTR	52±3mm

Figure 1-03

1.3 Names of Parts

1.3.1 Sectional View

1.3.1.1 Finisher Unit

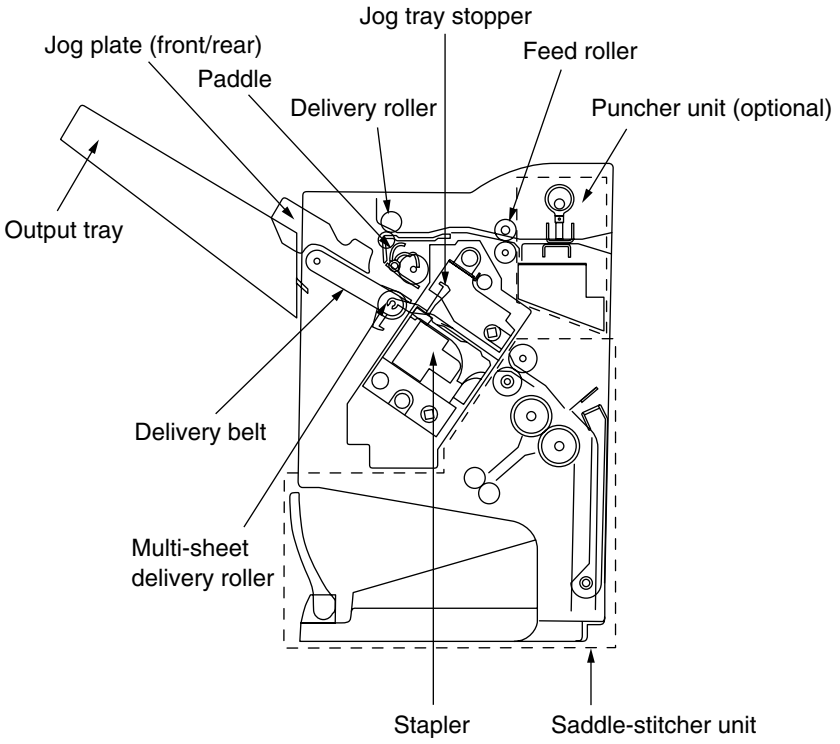


Figure 1-04

1.3.1.2 Saddle-Stitcher Unit

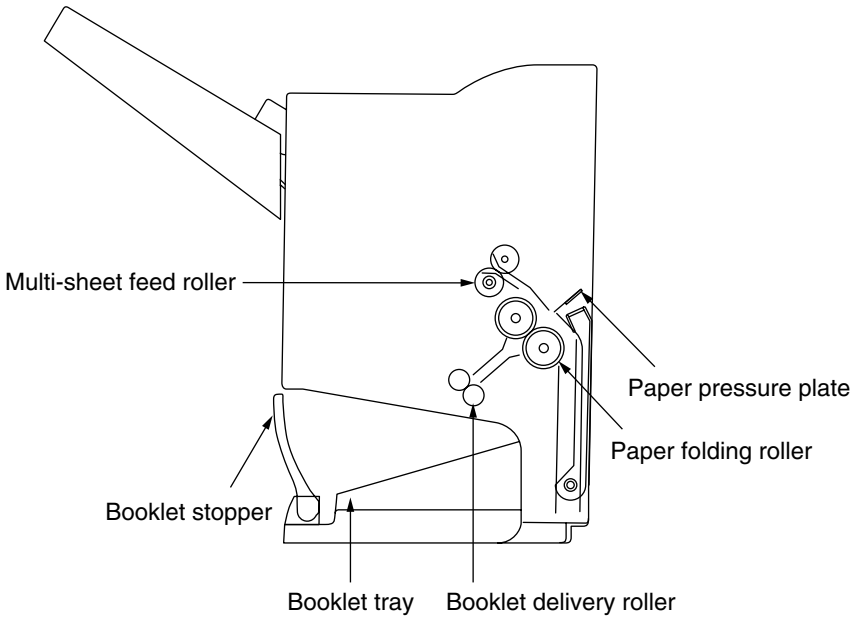


Figure 1-05

1.3.1.3 Puncher Unit (Optional)

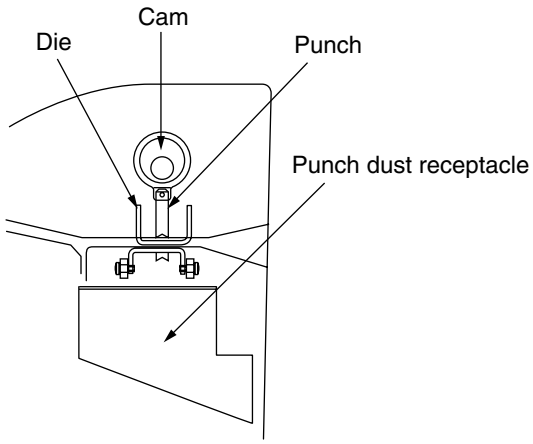


Figure 1-06

1.4 User Maintenance

Table 1-03

No.	Item	Timing
1	Staple cartridge replacement	The indicator lamp lights up (operation panel on the printer).
2	Punch dust disposal (optional)	The indicator lamp lights up (operation panel on the printer).

2. OPERATION

2.1 Basic Operation

2.1.1 Specification

The finisher outputs paper fed from a machine connected to it with non-sort stacking, job off-setting or stapling. The saddle-stitcher built in the finisher V-folds a set of documents sent from the finisher unit. These movements are controlled by the finisher controller circuit board and the commands sent from the connected machine.

The optional puncher unit is installed in the paper feeder of the finisher and it makes holes in paper sent from the connected machine. This movement is controlled by the puncher controller circuit board and the finisher controller circuit board.

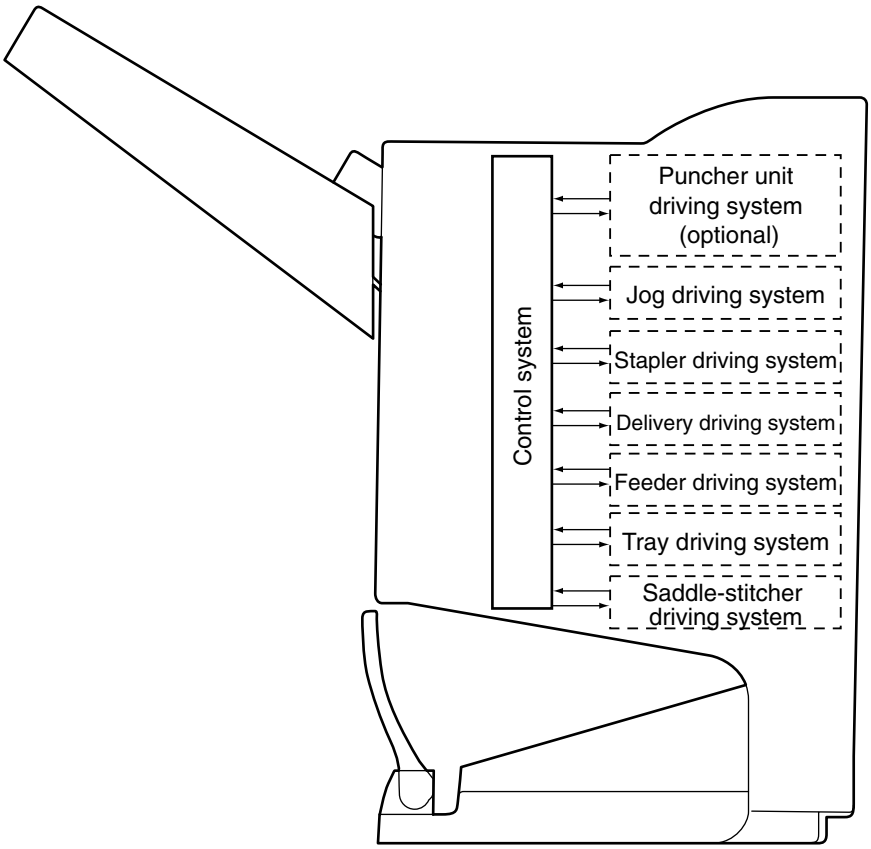


Figure 2-01

Note!

Job off-setting is stacking document sets slightly offset from one another in the direction of output to make it easier to sort them out.

2.1.2 Electric Circuit Overview

The finisher's operational sequence is controlled by the finisher controller circuit board. The finisher controller circuit board uses a 16-bit micro computer (CPU) for sequence control and serial communications with the connected machine.

The finisher controller circuit board drives the motors or other components according to a command transmitted from the connected machine over the serial communications line. The finisher controller circuit board also notifies the connected machine of information on the sensors and switches over the serial communications line.

The ICs mounted on the finisher controller circuit board serve the functions below.

- IC13 (CPU)
  Sequence control
- IC12 (EEP-ROM)
  Settings backup
- IC6 (EP-ROM)
  Sequence program
- IC11 (expansion port)
  Input/output-port expansion
- IC1 (Regulator IC)
  5V voltage generation

Figure 2-02 shows the flow of signals between the finisher and the optional controller.

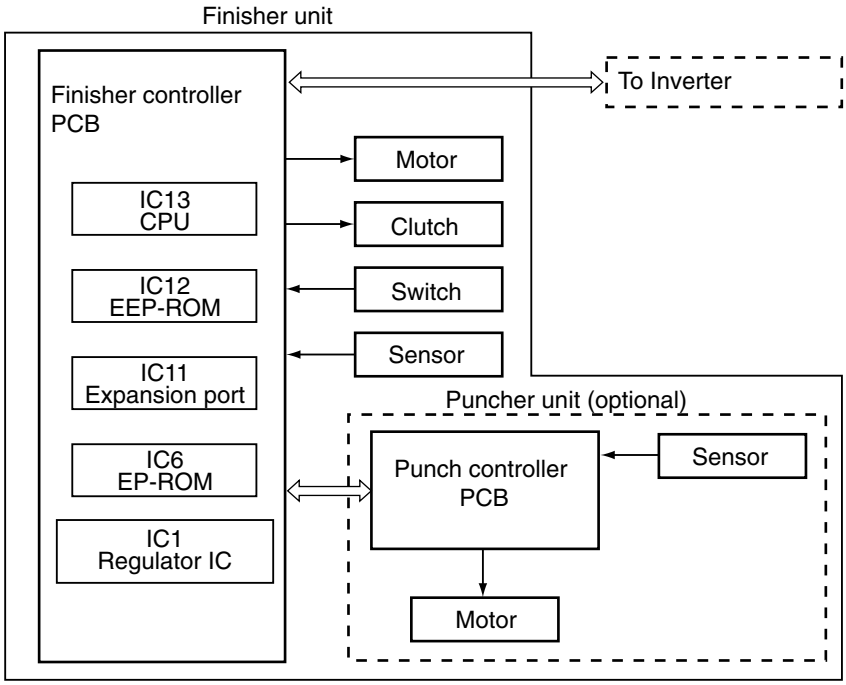


Figure 2-02

2.1.3 Finisher Controller Circuit Board Input/Output

2.1.3.1 Finisher Controller Circuit Board Input

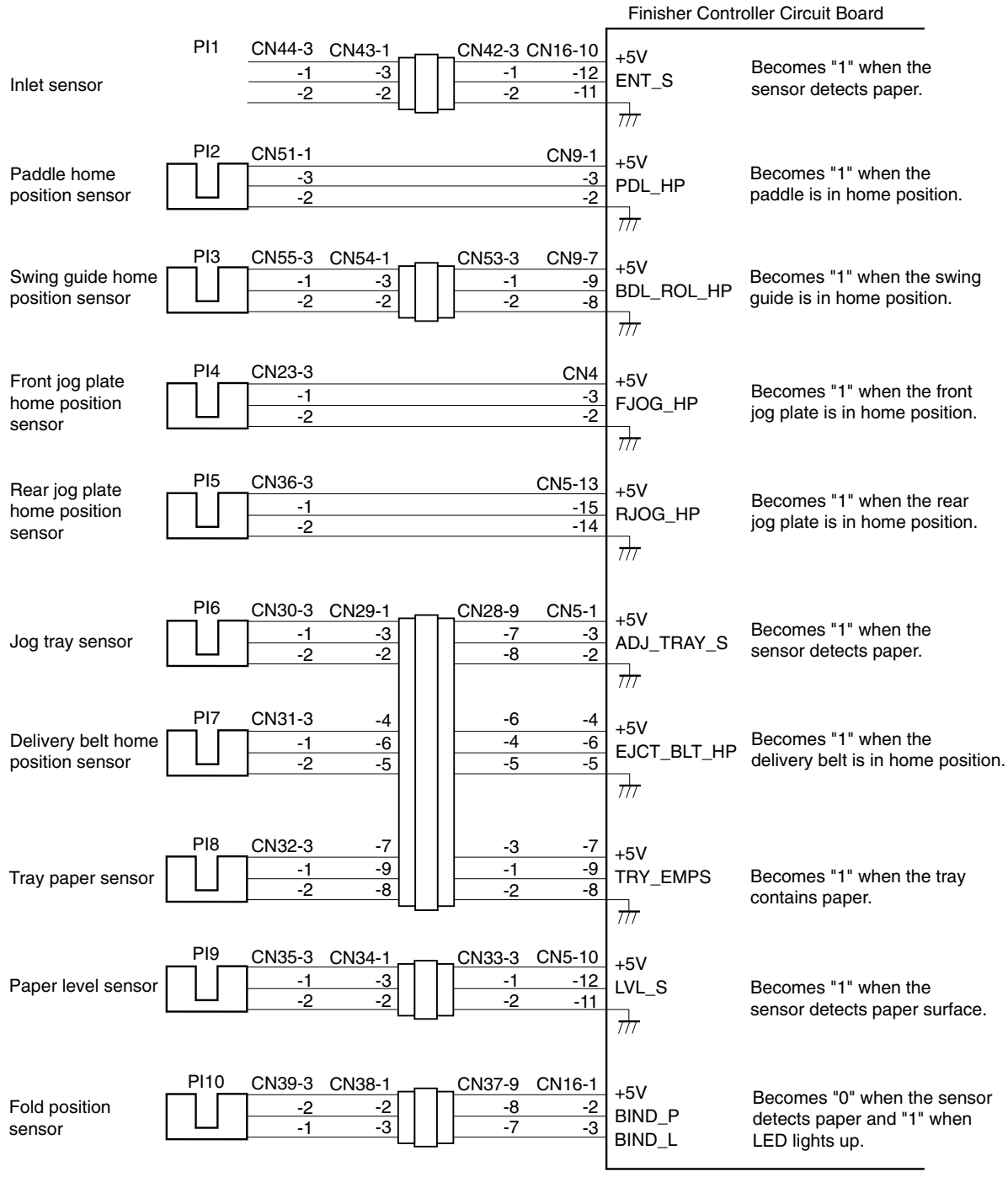


Figure 2-03 (1/2)

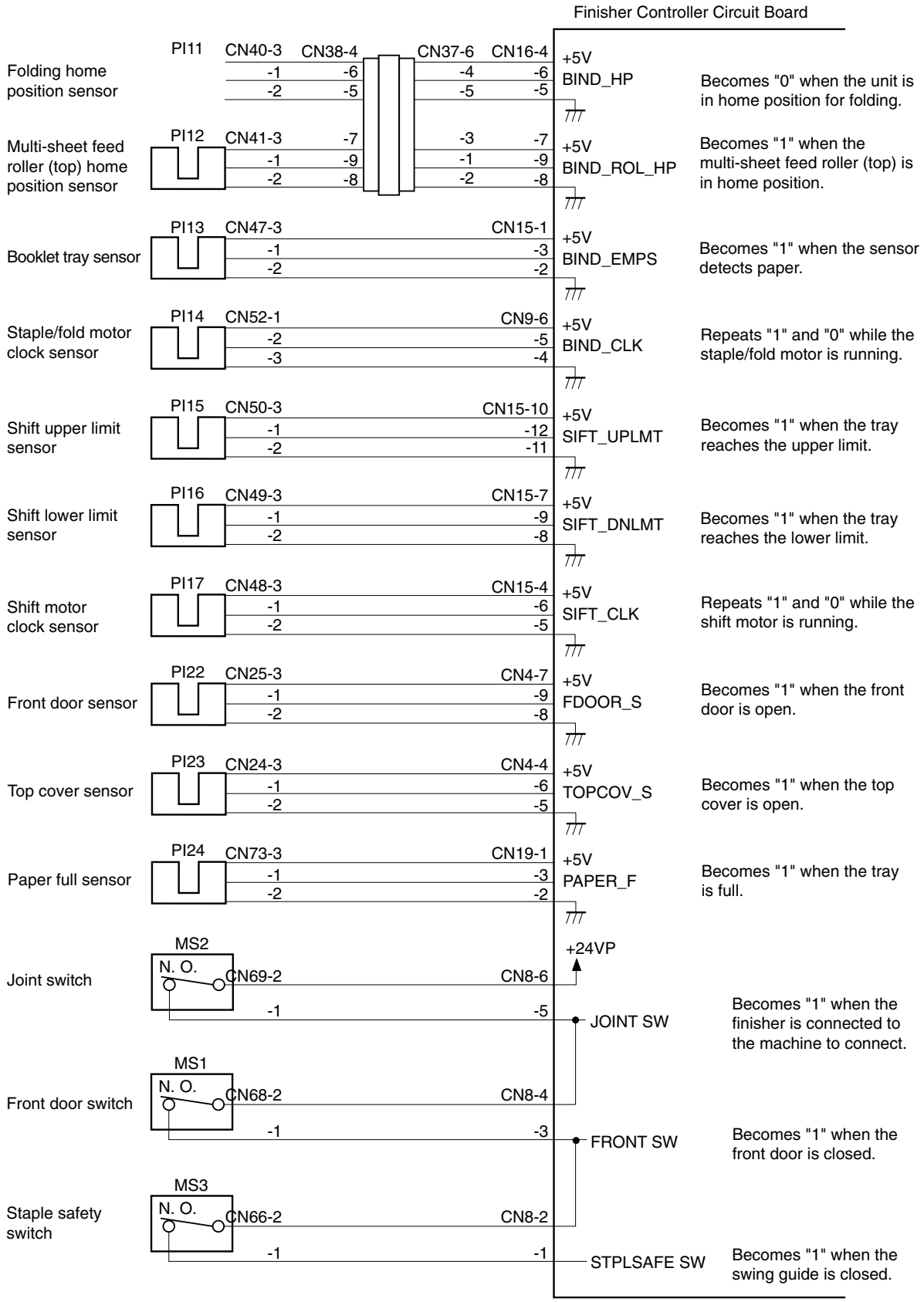


Figure 2-03 (2/2)

2.1.3.2 Finisher Controller Circuit Board Output

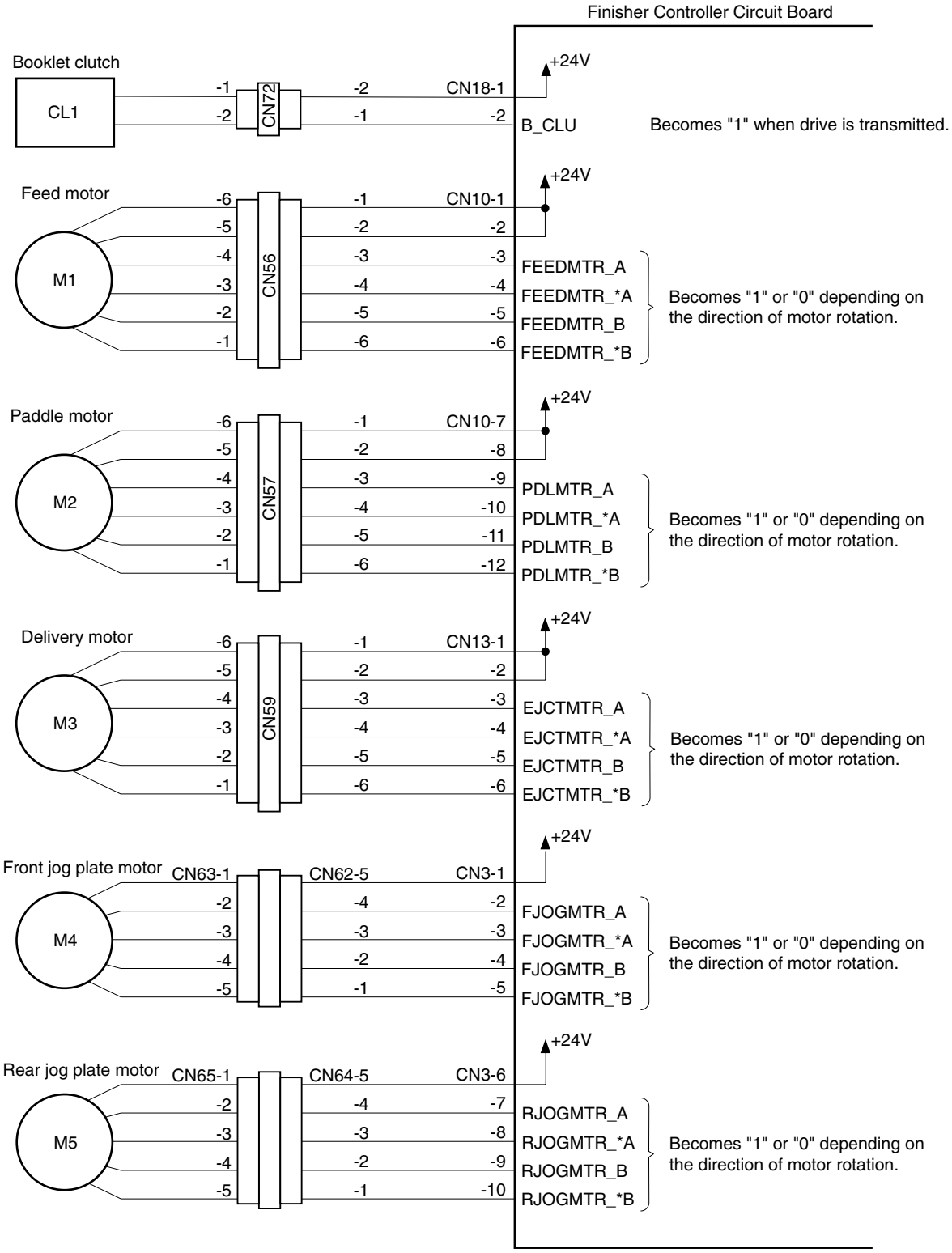


Figure 2-04 (1/2)

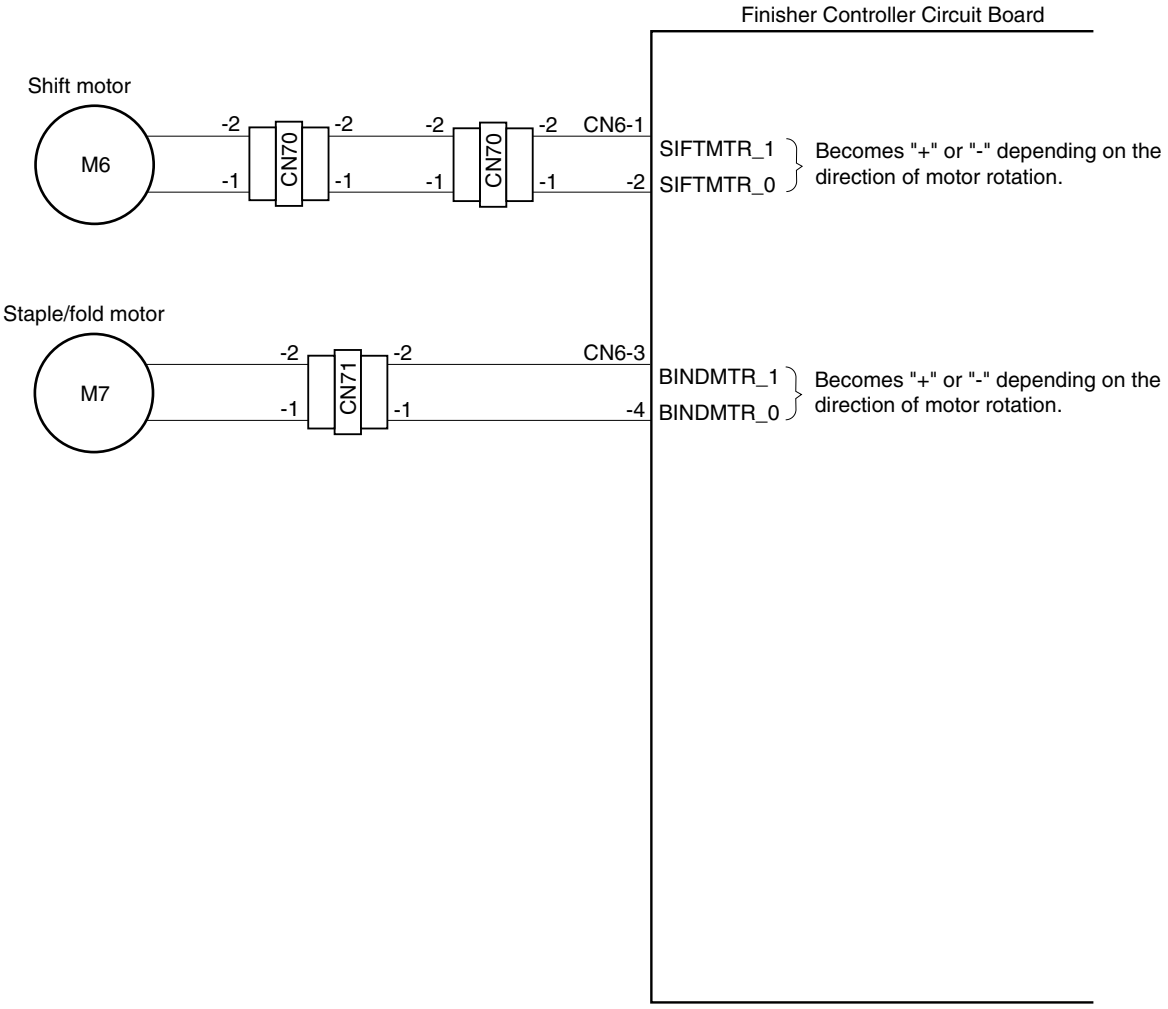


Figure 2-04 (2/2)

2.1.3.3 Finisher Controller Circuit Board Input/Output

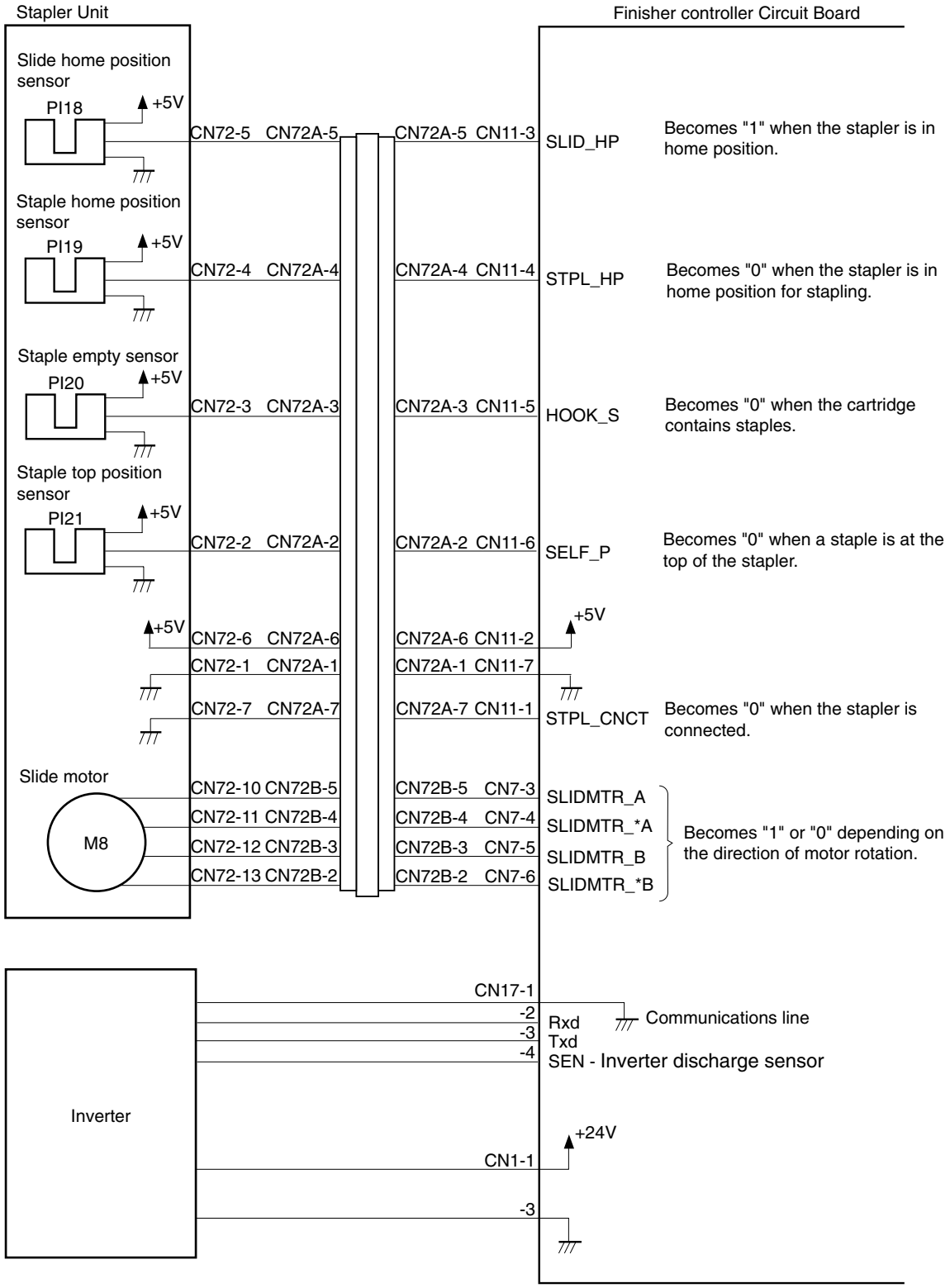


Figure 2-05

2.1.4 Punch Controller Circuit Board Input/Output (Optional)

2.1.4.1 Punch Controller Circuit Board Input/Output

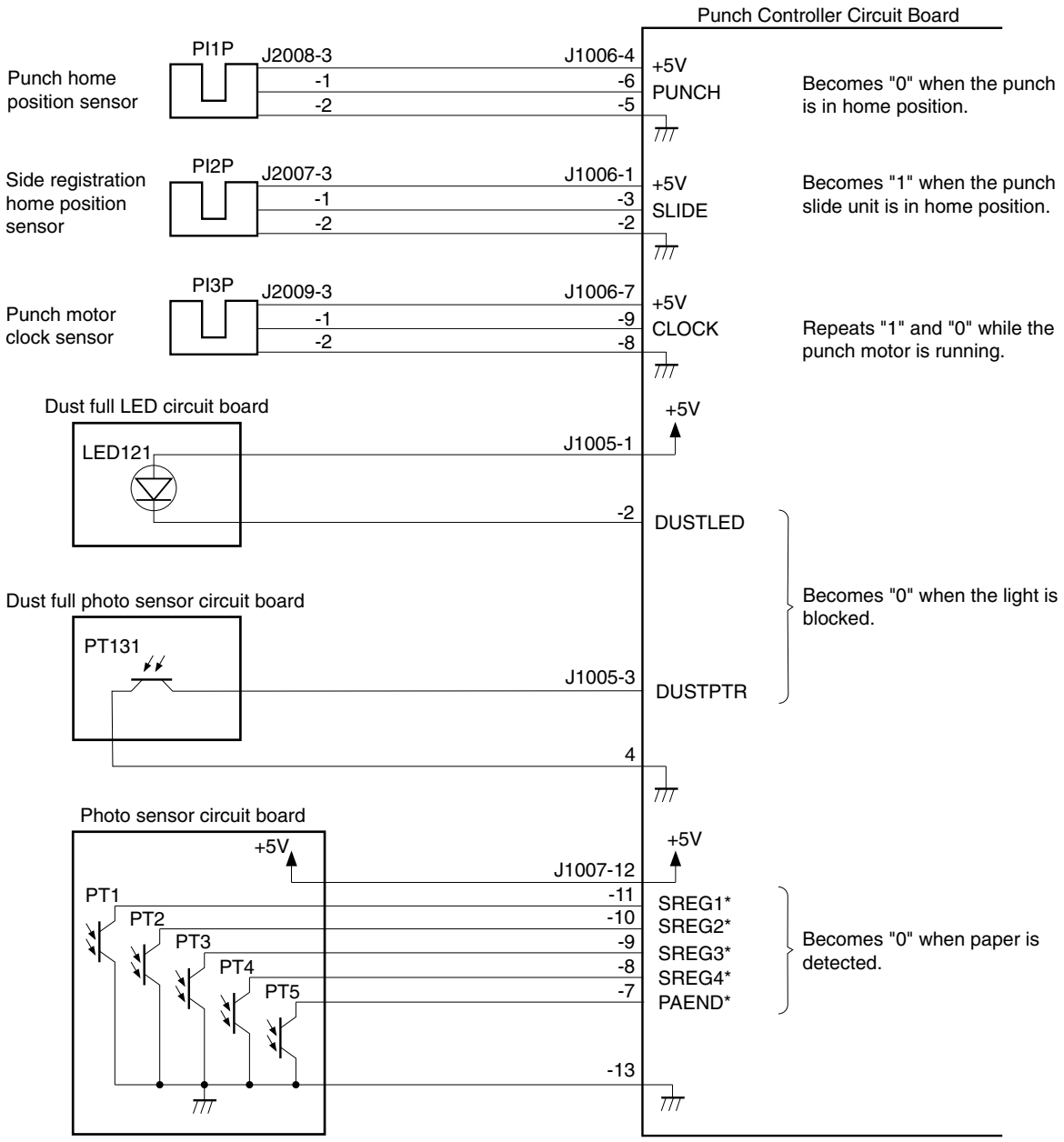


Figure 2-06

2.1.4.2 Punch Controller Circuit Board Output

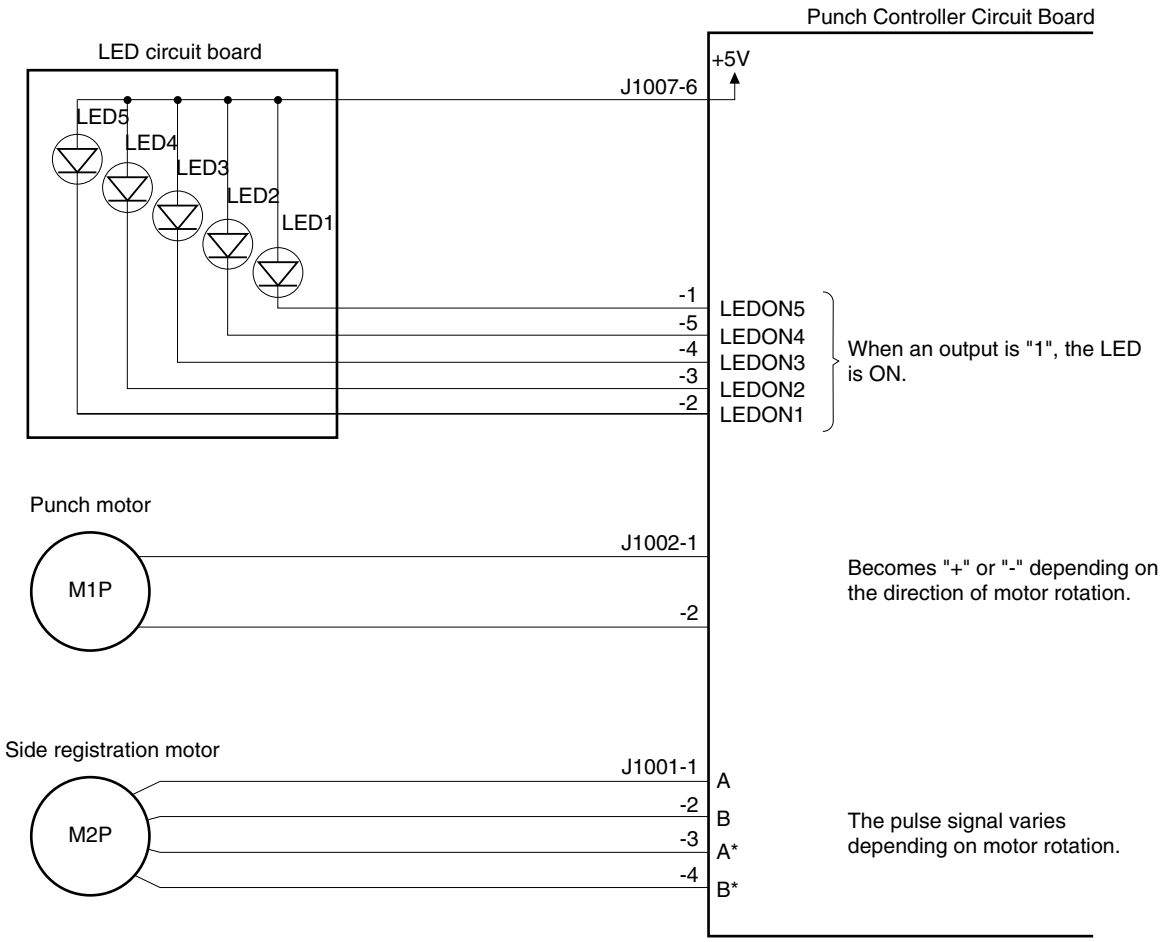


Figure 2-07

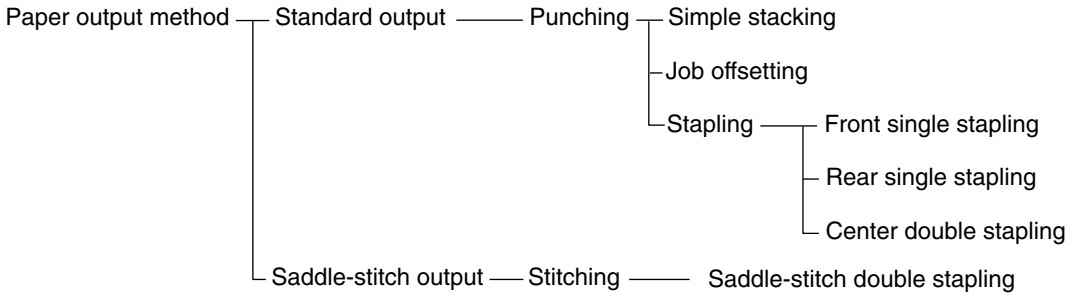
2.2 Feeding/Driving Systems

2.2.1 Overview

This finisher delivers documents sent from the printer to the output tray with simple stacking, job offsetting, stapling or V-folding in accordance with commands sent from the printer.

When the optional puncher unit is installed, documents are punched before delivered to the output tray.

Including the punching, there are five paper output methods all together.



2.2.1.1 Standard Output

1) Simple Stacking
Documents are drawn onto the jog tray and then delivered to the output tray.

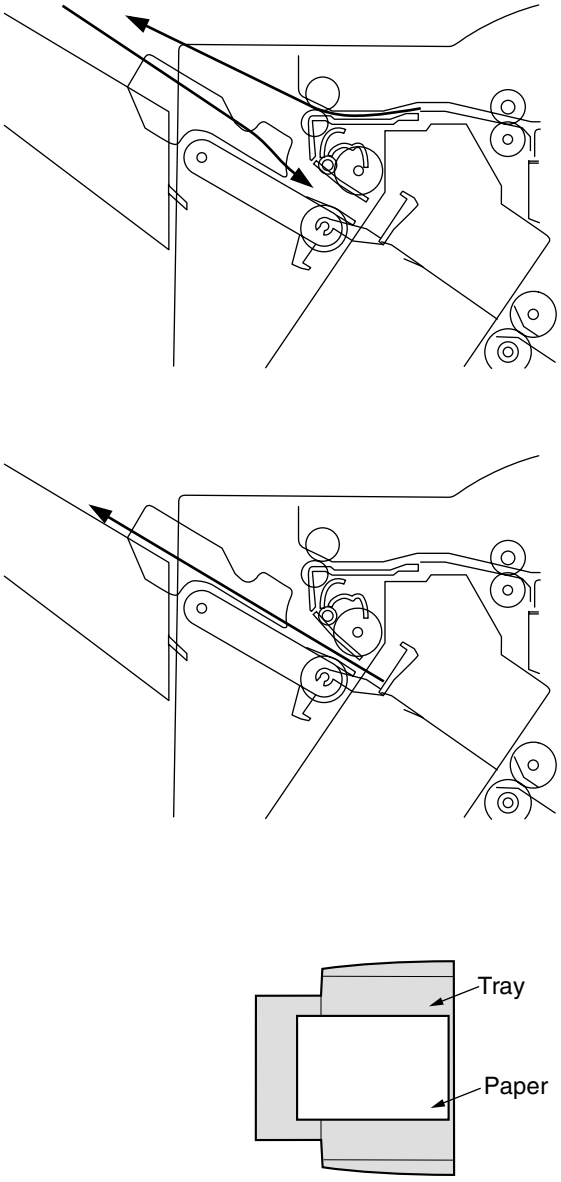
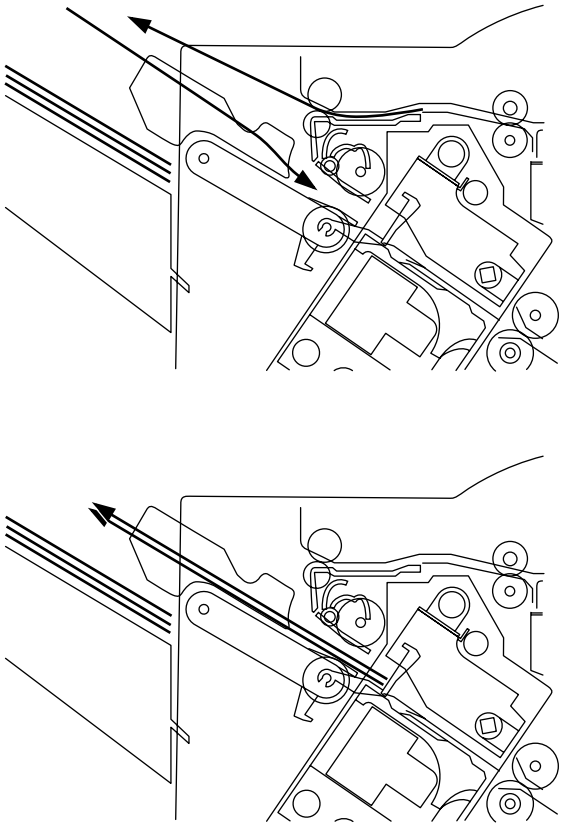


Figure 2-08

2) Job Offset
Before delivered to the output tray, a sheet is drawn onto the jog tray and moved to the front or rear. When 2 sheets stack on the jog tray, the set of the sheets are output together.



Paper output in 4-set job offsetting

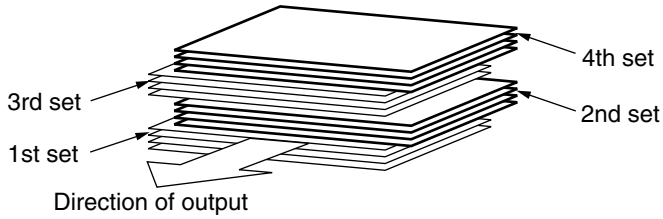


Figure 2-09

3) Stapling
Documents fed from the connected machine are stacked on the jog tray. When one set of documents stack on the tray, the finisher staples them together and sends out the stapled set to the output tray.

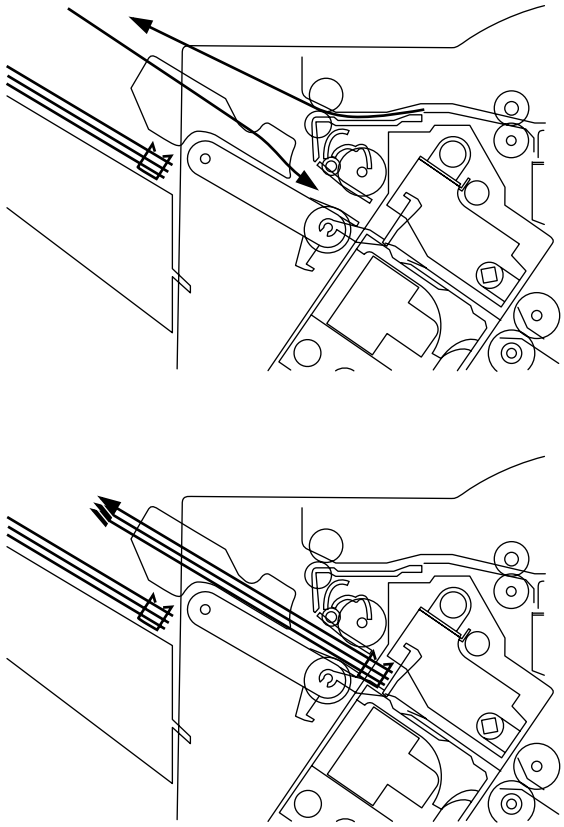


Figure 2-10

4) Saddle-Stitch Output
A set of documents stacked on the jog tray are stapled together (double stapling in the center) and then sent to the saddle-stitcher unit. The saddle-stitcher V-folds the stapled set and delivers it to the booklet tray.

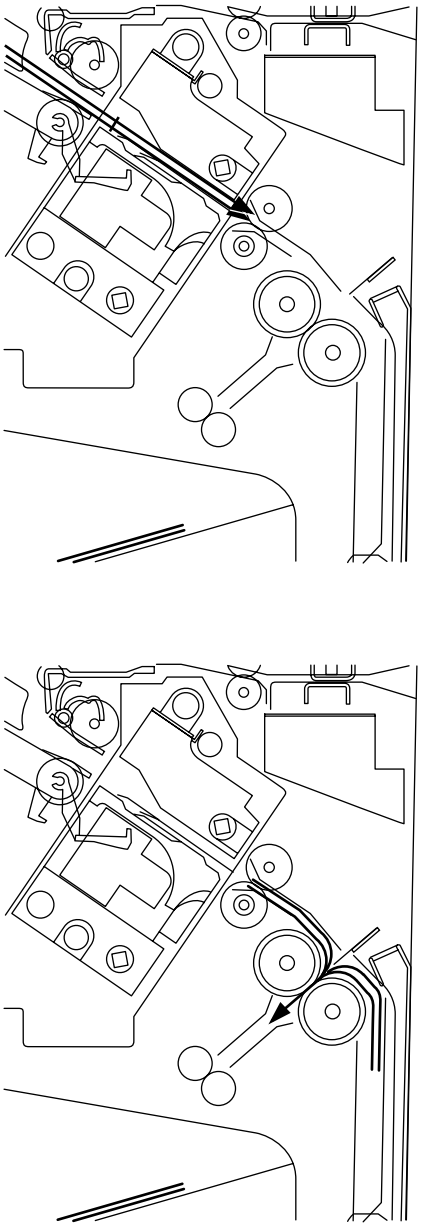


Figure 2-11

2.2.2 Feeding and Output

2.2.2.1 Overview

The finisher feeds documents sent from the printer to the output tray, the jog tray or the saddle-stitcher unit depending on output mode. When documents are fed to the jog tray or the saddle-stitcher unit, they are offset, stapled or V-folded in accordance with the command sent from the printer.

Table 2-01 shows the motors relating to paper feeding and jogging. These motors rotate forward or backward by the control of the micro computer (CPU) on the finisher controller circuit board.

Table 2-02 shows the sensors installed in the paper feeding path. These sensors detect the arrival or passing of paper.

If paper fails to arrive at or pass a sensor within the specified time, the finisher controller circuit board determines that a paper jam has occurred. The finisher stops operation and notifies the printer of the jam.

Table 2-01

Code	Description	Remarks	Connector on the finisher controller PCB
M1	Feed motor	Stepping motor	CN10
M2	Paddle motor	Stepping motor	CN10
M3	Delivery motor	Stepping motor	CN13
M4	Front jog plate motor	Stepping motor	CN3
M5	Rear jog plate motor	Stepping motor	CN3
M7	Staple/fold motor	Brush DC motor	CN6

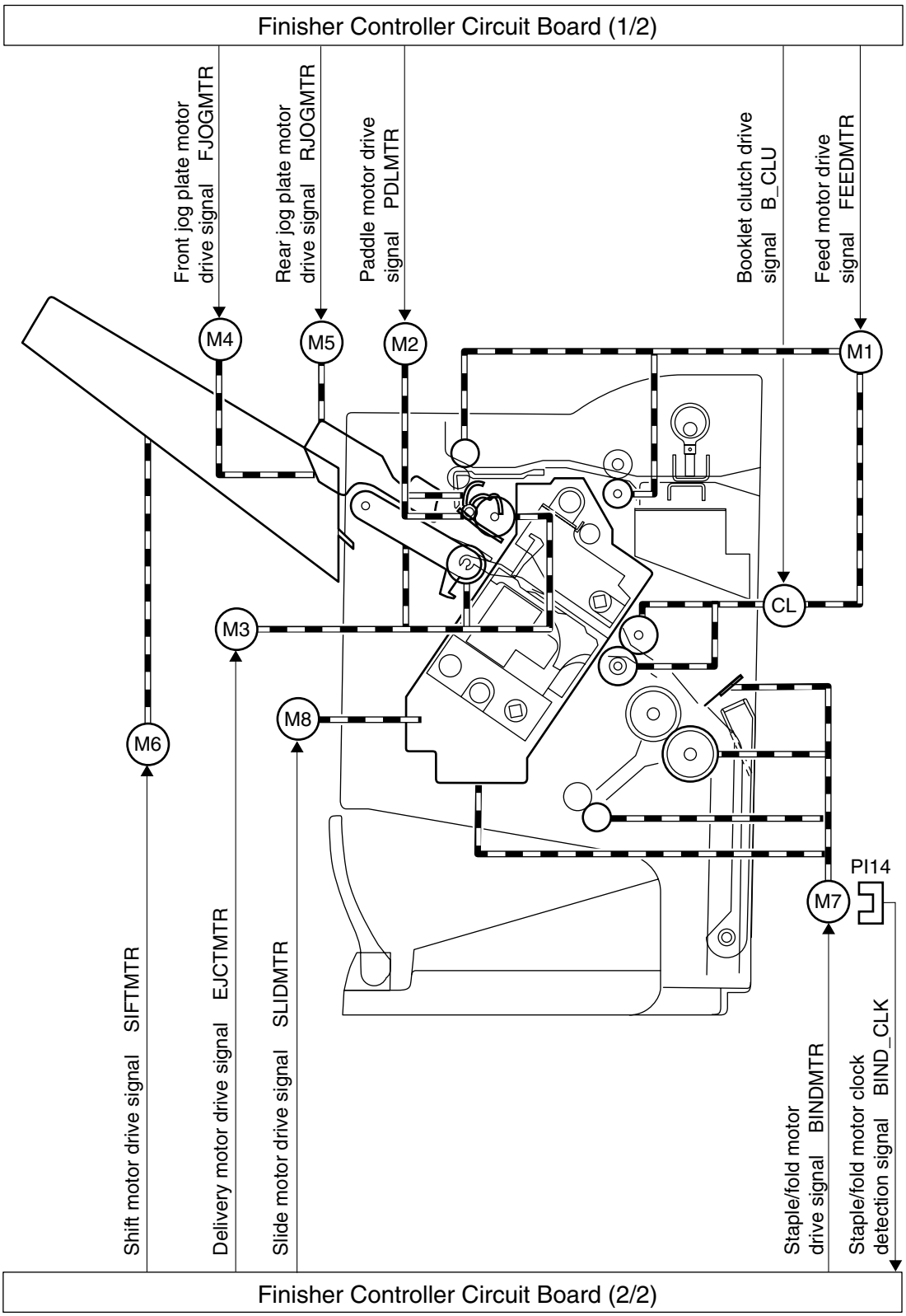


Figure 2-12 (1/2)

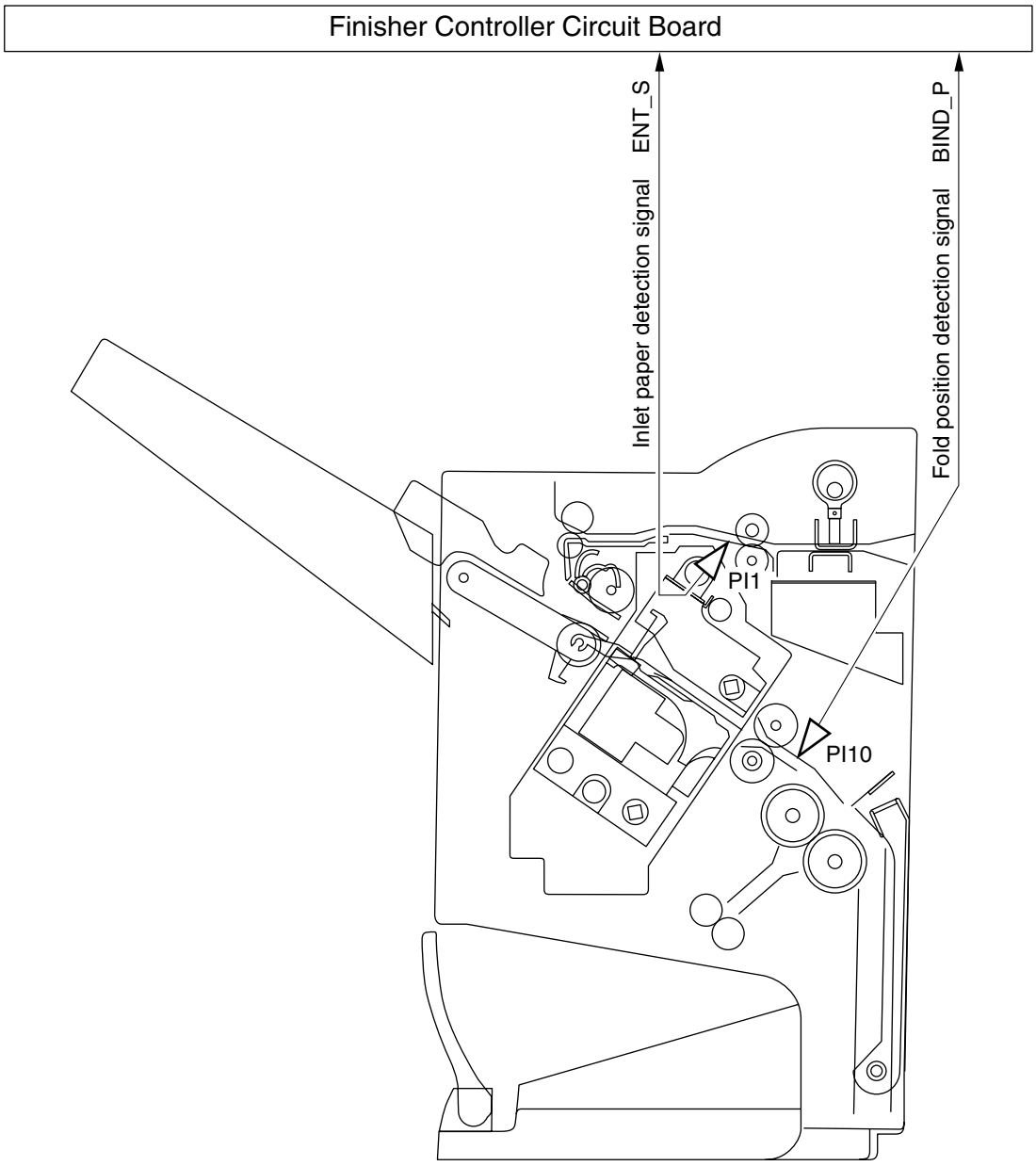


Figure 2-12 (2/2)

Table 2-02

Code	Description	Remarks	Connector on the finisher controller PCB
PI1	Inlet sensor	Photo interrupter	CN16
PI10	Fold position sensor	Photo reflector	CN16

2.2.3 Job Offsetting

2.2.3.1 Overview

The Job offset function sorts out documents by moving each set of documents to the front or the rear before sending them out to the output tray.

The documents are moved to the front or the rear by the front or rear jog plate. After passing the delivery roller, paper is fed onto the jog tray and sent towards the stopper by the paddle.

The swing guide is in its upper position, while paper is drawn onto the jog tray and jogged. The guide is in its lower position during multi-sheet feeding, multi-sheet delivery, and stapling.

When power is turned on, the finisher controller circuit board drives the front jog plate motor (M4) and the rear jog plate motor (M5) to return the two jog plates to home position.

Table 2-03

Sensor	Code	Connector	Function	Motor	Code
Front jog plate home position sensor	PI4	CN4-3	Drive the front jog plate.	Front jog plate motor	M4
Rear jog plate home position sensor	PI5	CN5-15	Drive the rear jog plate.	Rear jog plate motor	M5
Swing guide home position sensor	PI3	CN9-9	Drive the swing guide.	Paddle motor	M2
Paddle home position sensor	PI2	CN9-3	Drive the paddle (feed paper).	Paddle motor	M2

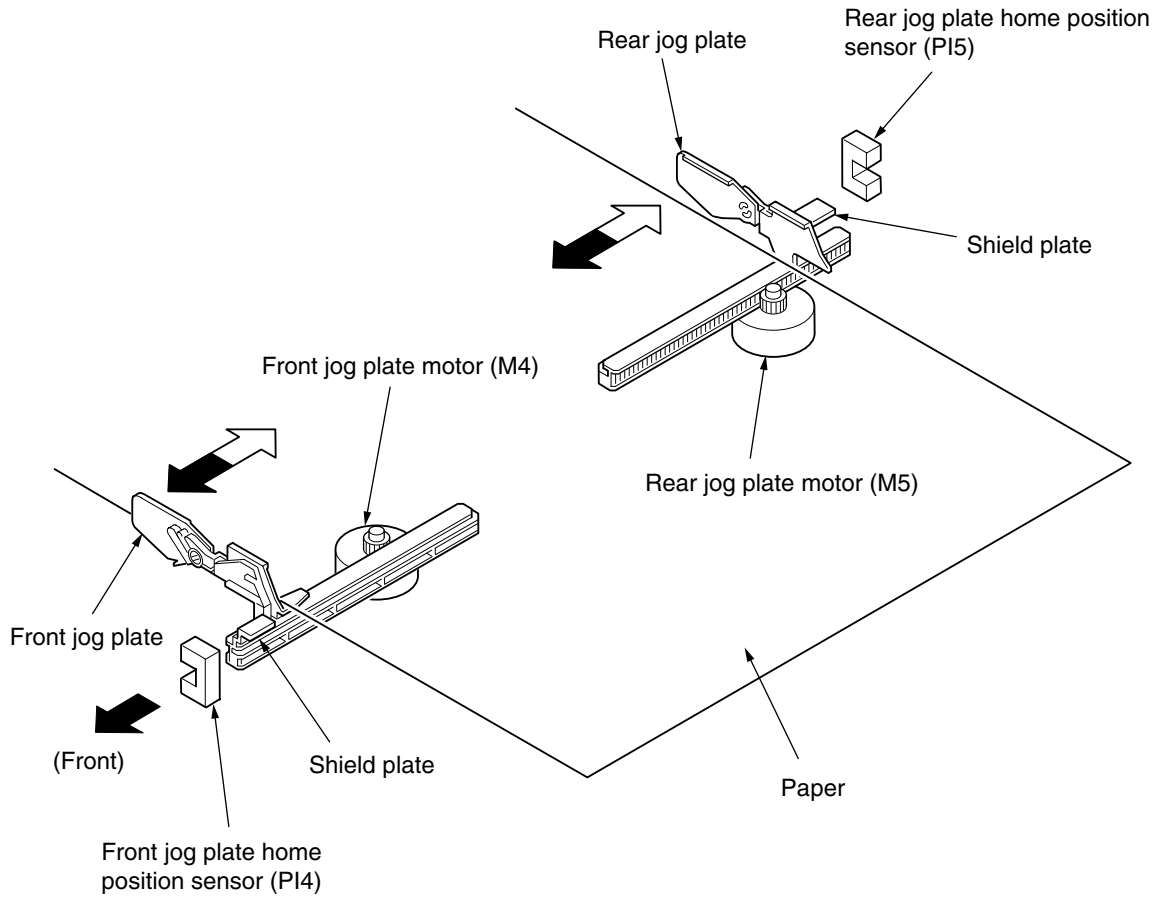


Figure 2-13

2.2.3.2 Paper Stacking for Jog Tray

After passing through the ejector roller, the paper is fed to the processing tray. The paddle then presses against* the upper surface of the paper to align the rear edge of the paper with the processing-tray stopper.

* Number of cycles:

Non-staple mode: Twice for the first sheet; once for each subsequent sheet
Staple mode: Once or three times, as selected by a command from the main unit

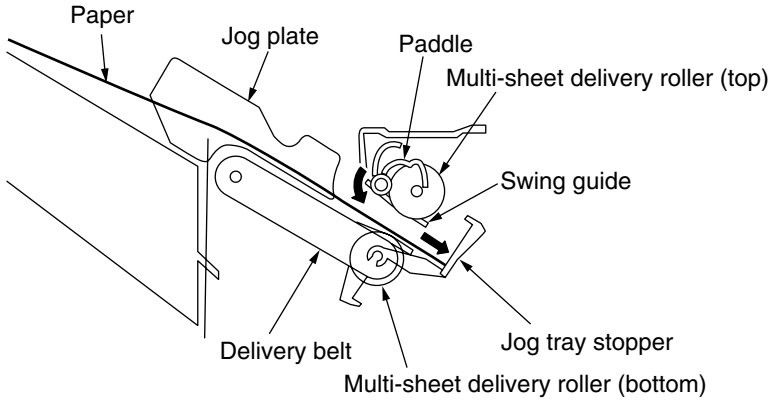


Figure 2-14

2.2.3.3 Offsetting

The front or rear jog plate moves documents to the front or rear. Offsetting is performed every time a document is drawn onto the jog tray.

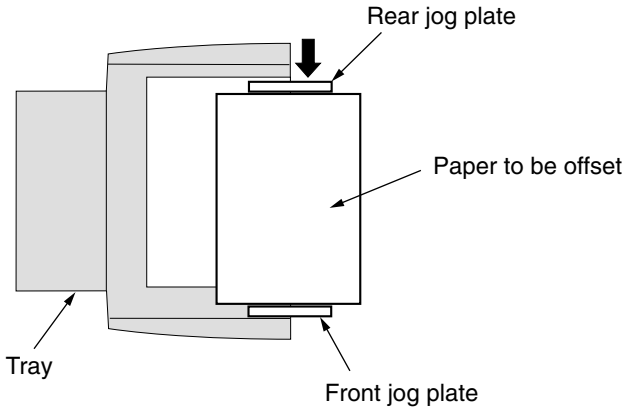


Figure 2-15 (1/2) Moving to Front

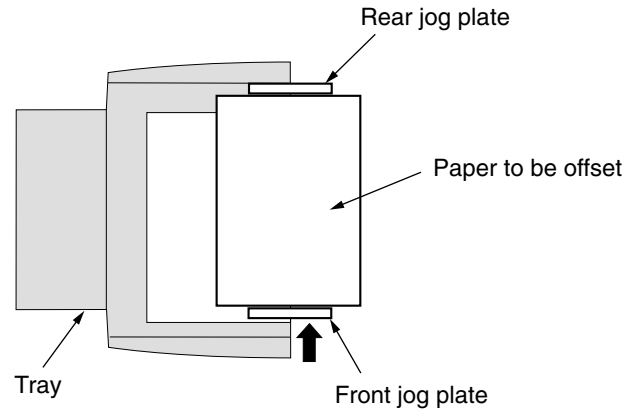


Figure 2-15 (2/2) Moving to Rear

2.2.3.4 Multi-Sheet Output

Every time 2 large-size sheets or 2 small-size sheets have stacked on the jog tray, they are output all together from the tray.

The paddle motor starts running and the swing guide is lowered, which causes the top and bottom multi-sheet delivery rollers to sandwich the stack of documents. The delivery motor rotates forward and the documents sandwiched between the multi-sheet delivery rollers are fed in the output direction. The delivery belt home position sensor is turned off and, after the delivery motor runs for the specified number of pulses, the swing guide goes up. The delivery motor continues to run and the documents are output by the claw that rotates in synchronization with the rotation of the bottom multi-sheet delivery roller.

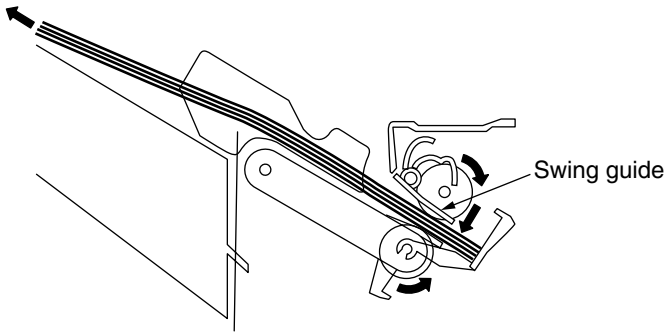


Figure 2-16 (1/2)

Job Offset Sequence

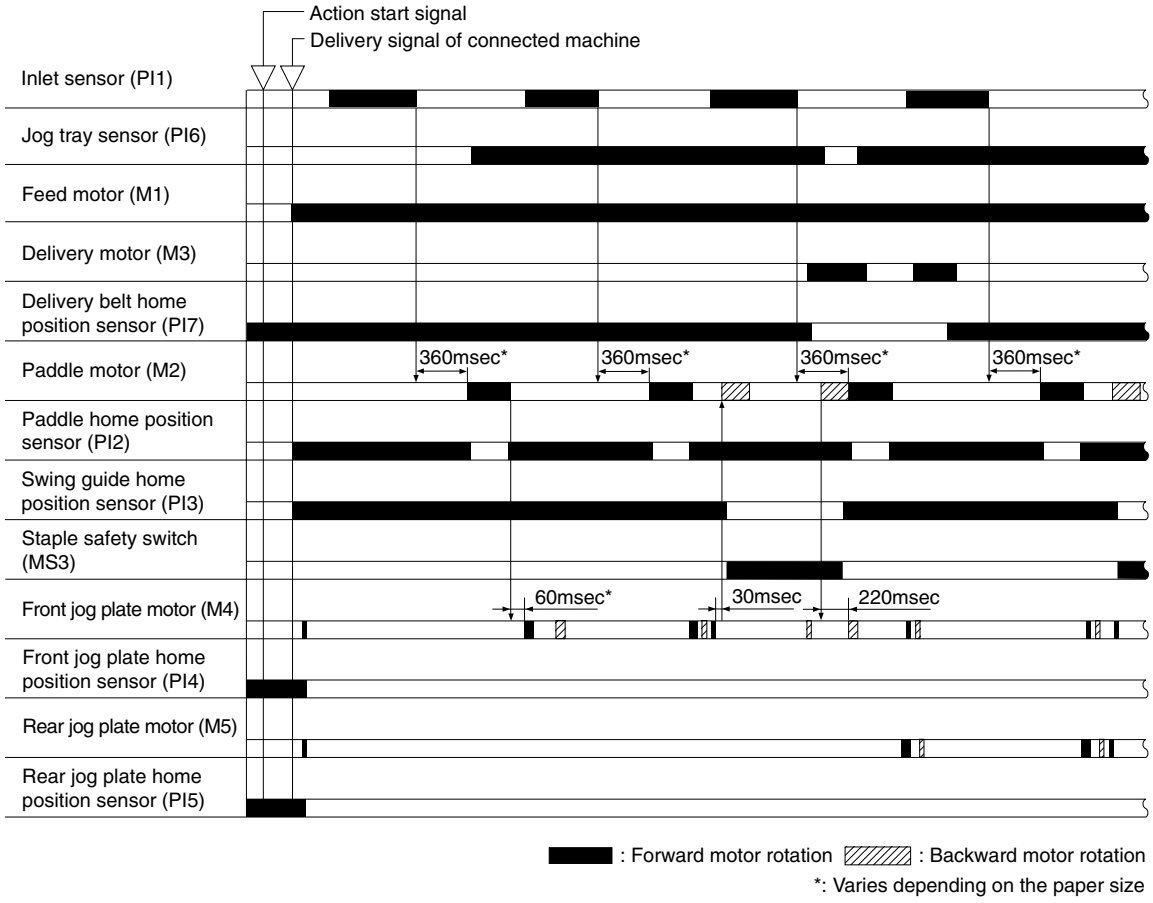


Figure 2-16 (2/2)

2.3 Stapling

2.3.1 Overview

The stapling function does stapling of the specified number of documents using the stapler unit. The stapling positions vary depending on the staple mode and paper size.

After power is turned on or when the front door is opened and closed, the finisher controller circuit board drives the slide motor (M8) to return the stapler unit to home position. The stapler unit begins to move towards the front of the stapler frame. The stapler unit stops, when the slide home position sensor (PI18) on the slide circuit board at the bottom of the stapler unit detects the shield plate. The slide motor is driven for the specified number of pulses. The stapler unit begins to move again and stops in the standby position in the rear.

Table 2-04

Sensor	Code	Connector	Function	Remarks
Slide home position sensor	PI18	CN11-3	Detects stapler home position in movement to the front and the rear.	-
Staple home position sensor	PI19	CN11-4	Detects stapling home position.	Inside the stapler
Staple empty sensor	PI20	CN11-5	Detects if the cartridge contains staples.	Inside the stapler
Staple top position sensor	PI21	CN11-6	Detects the staple at the top of the stapler.	Inside the stapler

Function	Motor	Code	Remarks
Driving for stapler movement	Slide motor	M8	-
Driving for stapling	Staple/fold motor	M7	-

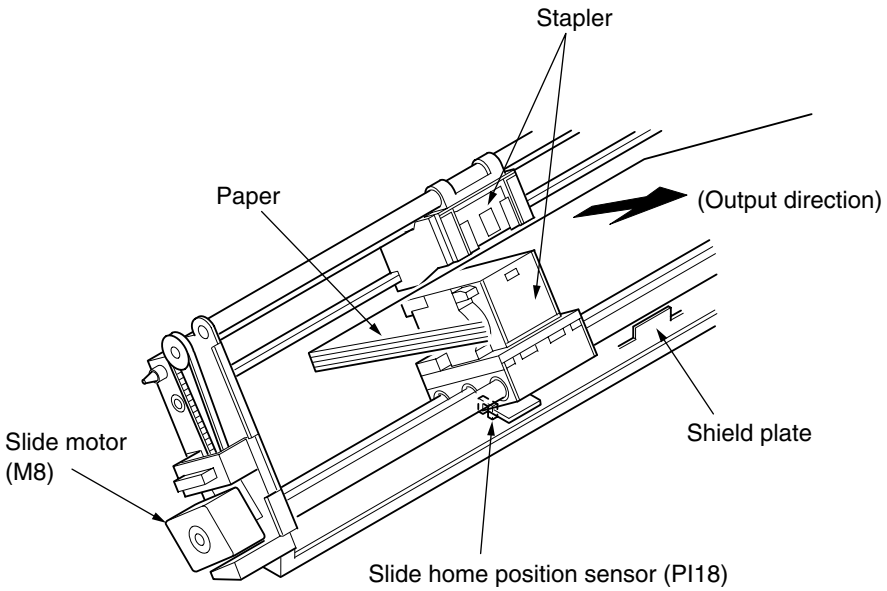


Figure 2-17

2.3.2 Stapling

The finisher controller circuit board, upon completion of stacking onto the jog tray and jogging, runs the paddle motor backward to lower the swing guide. Lowering the swing guide, the top and bottom multi-sheet delivery rollers sandwich the documents set.

The finisher controller circuit board moves the stapler in accordance with the specified stapling position and the stapler staples the documents (the stapler is not moved for rear single stapling and it does stapling in its standby position). When the stapler is moved to the front, the jog tray stopper is knocked down.

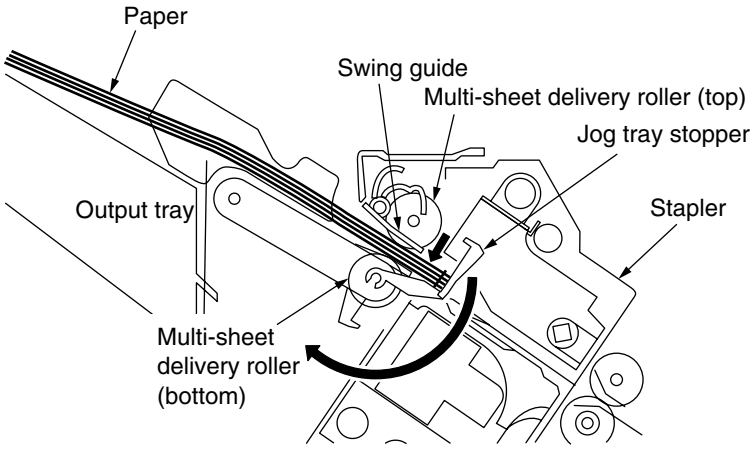


Figure 2-18 (1/2)

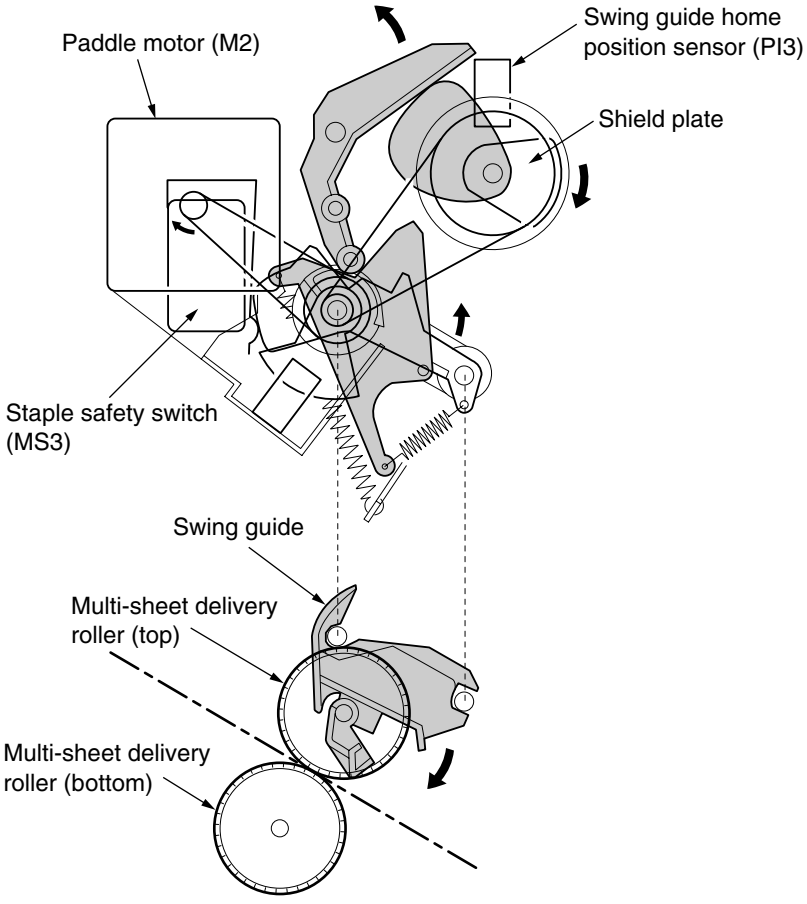


Figure 2-18 (2/2)

2.3.3 Paper Output after Stapling

After stapling is completed, the finisher controller circuit board runs the delivery motor forward to feed a set of documents sandwiched between the multi-sheet delivery rollers in the output direction. The delivery belt home position sensor is turned off. After the delivery motor has run for the specified number of pulses, the swing guide goes up. As soon as the swing guide goes up, the slide motor begins to run and the stapler is returned into the standby position in the rear. The delivery motor continues to run and the document set is output by the claw that rotates in synchronization with the rotation of the bottom multi-sheet delivery roller.

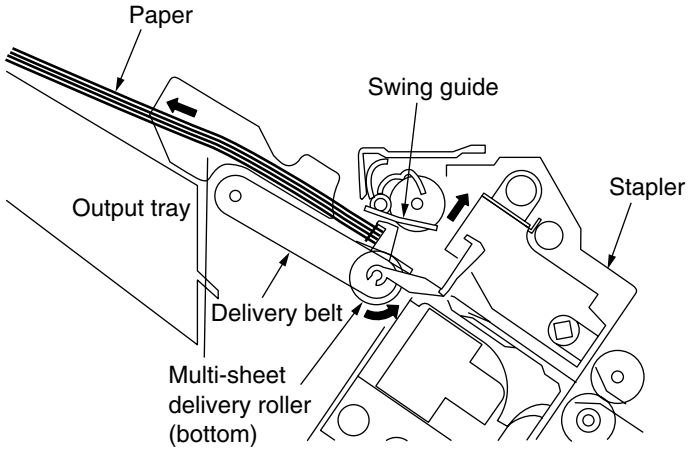


Figure 2-19 (1/2)

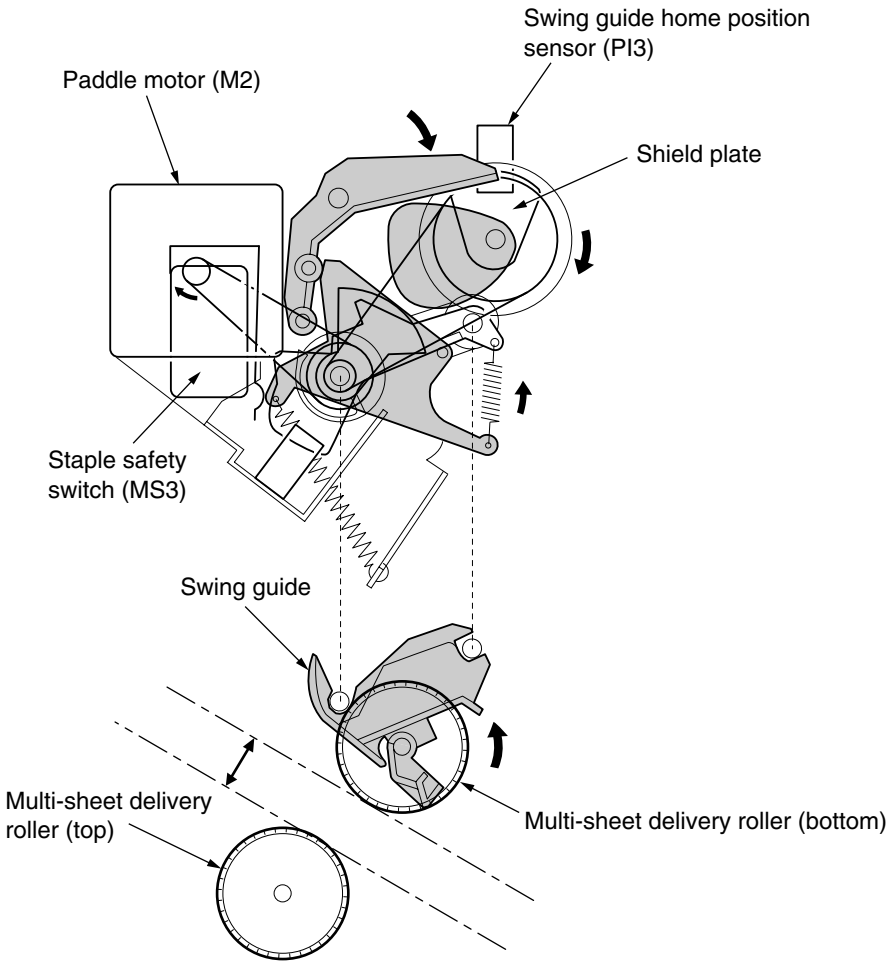


Figure 2-19 (2/2)

2.3.4 Stapler Unit

The stapling movement is produced by the staple/fold motor (M7). As the motor rotates the cam one revolution, the stapler does stapling. The cam's home position is detected by the staple home position sensor (PI19).

The staple/fold motor is controlled by the microcomputer (IC13) on the finisher controller circuit board whether it rotates forward or backward.

When the staple home position sensor is off, the finisher controller circuit board runs the staple/fold motor forward until the sensor is turned on to return the staple cam into the initial state.

The staple empty sensor (PI20) detects whether there is a staple cartridge or staples in the cartridge. The staple top position sensor (PI21) detects whether a staple is pushed to the top of the cartridge.

The finisher controller circuit board doesn't drive the staple/fold motor (M7) unless the staple safety switch (MS3) is on (the swing guide is closed). This is to ensure safety, for example, in case an operator puts his/her finger in the stapler.

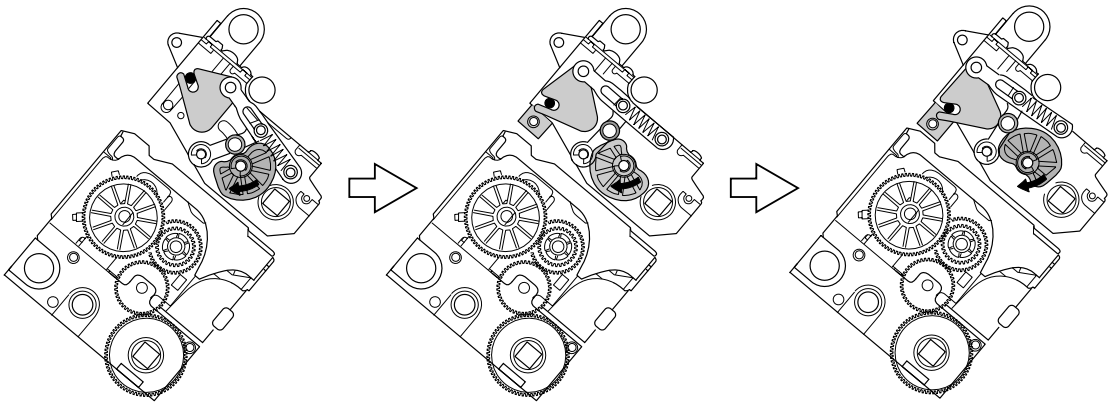


Figure 2-20 (1/2)

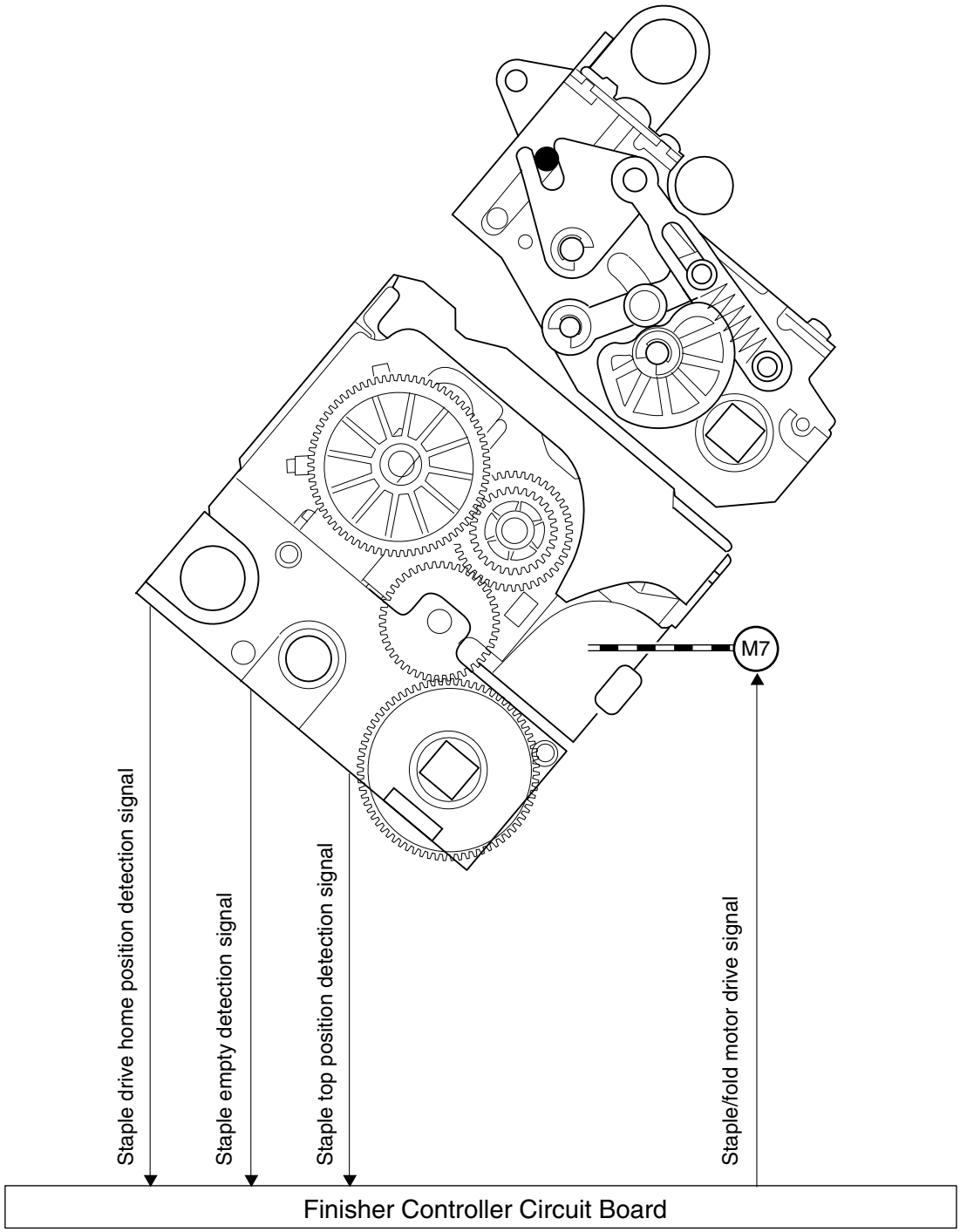

M7
Staple drive home position detection signal
Staple empty detection signal
Staple top position detection signal
Staple/fold motor drive signal
Finisher Controller Circuit Board

Figure 2-20 (2/2)

2.3.4.1 Stapler Unit Movement Control

The stapler unit is moved by the slide motor (M8). Its home position is detected by the slide home position sensor (PI18). The stapler stands by in the rear of the stapler frame in any staple mode and for any paper size. After documents have been stacked on the jog tray, upon receipt of a command for stapling from the printer, the stapler moves into the specified stapling position.

Figures from 2-21 below show the stapler's standby position and stapling positions according to staple mode.

1) Front Single Stapling
The stapler stands by in the rear. The stapler moves to the stapling position and then comes back to the standby position every time it does stapling.

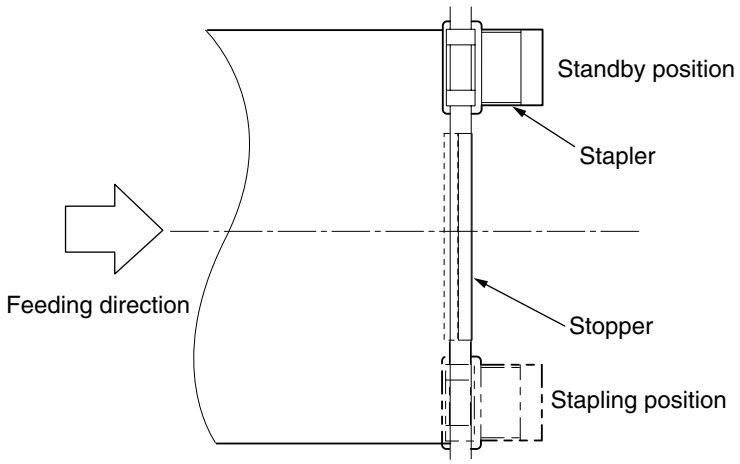


Figure 2-21

2) Rear Single Stapling
The stapler stands by in the rear. The stapling position is the same as the standby position.

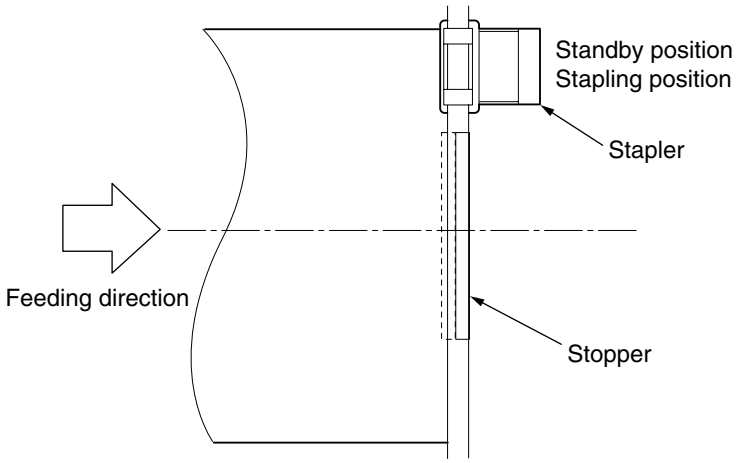


Figure 2-22

3) Center Double Stapling
The stapler stands by in the rear. The stapler moves to the stapling position and then comes back to the standby position every time it does stapling. Documents are stapled in the rear first and then in the front.

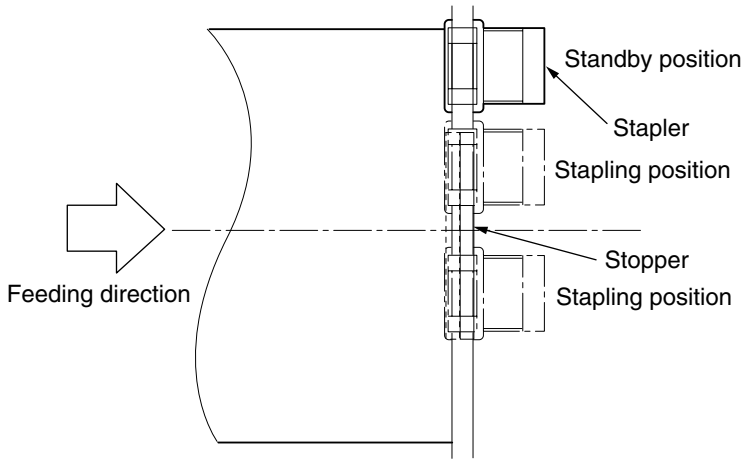


Figure 2-23

4) Saddle-Stitch Double Stapling (in booklet mode)
The stapler stands by in the rear. The stapler moves to the stapling position and then comes back to the standby position every time it does stapling. Documents are stapled in the rear first and then in the front.

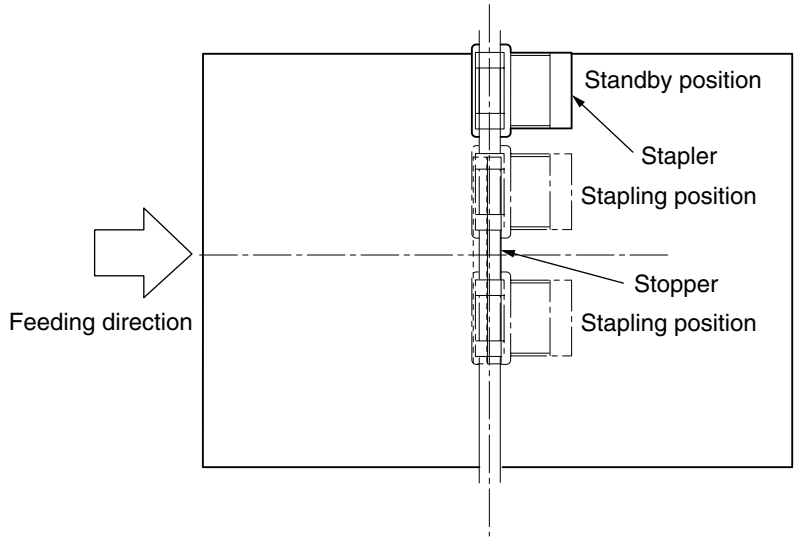


Figure 2-24

Stapling Sequence

Two-Sheet Rear Single Stapling

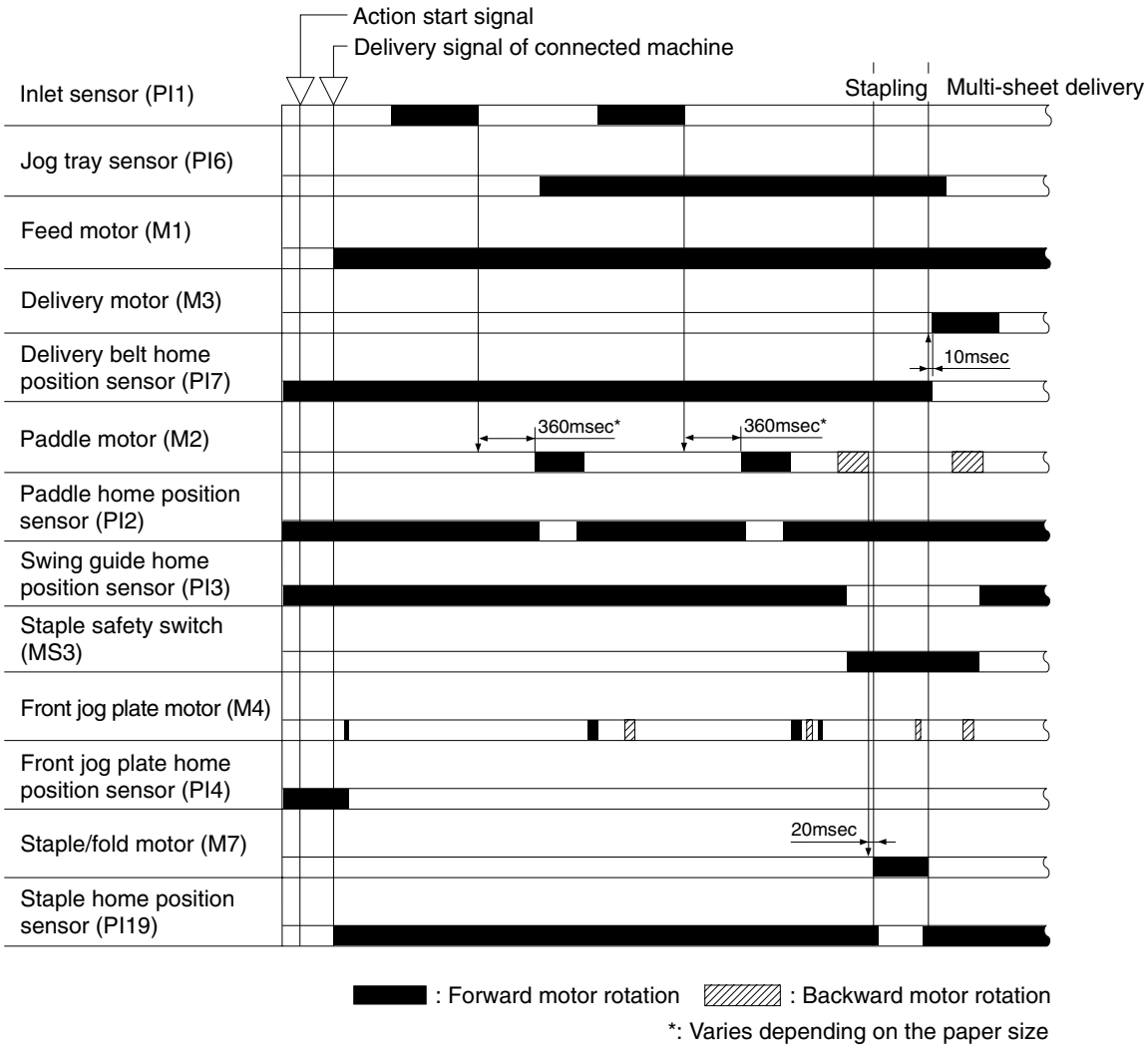


Figure 2-25

2.4 Tray Operation

2.4.1 Overview

The finisher has the output tray in the finisher unit and the booklet tray in the saddle-stitcher unit.

The booklet tray in the saddle-stitcher unit is a fixed tray. All the bound document sets are output to this tray. The booklet tray is equipped with the booklet tray sensor (PI13) for detecting paper on the tray.

The output tray in the finisher unit moves up and down, driven by the shift motor (M6). The finisher unit has the tray paper sensor (PI8) for detecting paper on the output tray.

The home position of the output tray is detected by the paper level sensor (PI9). The home position is where the top surface of paper stack is detected, if documents are stacked on the output tray. It is where the edge of the output tray is detected, if no paper is stacked on the tray. When power is turned on, the finisher controller circuit board drives the shift motor (M6) to return the output tray to home position.

When paper is delivered from the jog tray to the output tray, the shift motor runs for the specified number of clock signals and the output tray is lowered. The clock signals are detected by the shift motor clock sensor (PI17). The output tray returns to home position for next stacking.

The shift upper limit sensor (PI15) detects the upper limit of the output tray. When the shift upper limit sensor (PI15) is turned on, the finisher controller circuit board stops the drive (ascent) of the shift motor (M6).

The shift lower limit sensor (PI16) detects the lower limit of the output tray. When the shift lower limit sensor (PI15) is turned on, the finisher controller circuit board stops the drive (descent) of the shift motor (M6).

The finisher unit also has the paper full sensor (PI24) to detect over-stacking due to large-size or mixed-size paper stacking.

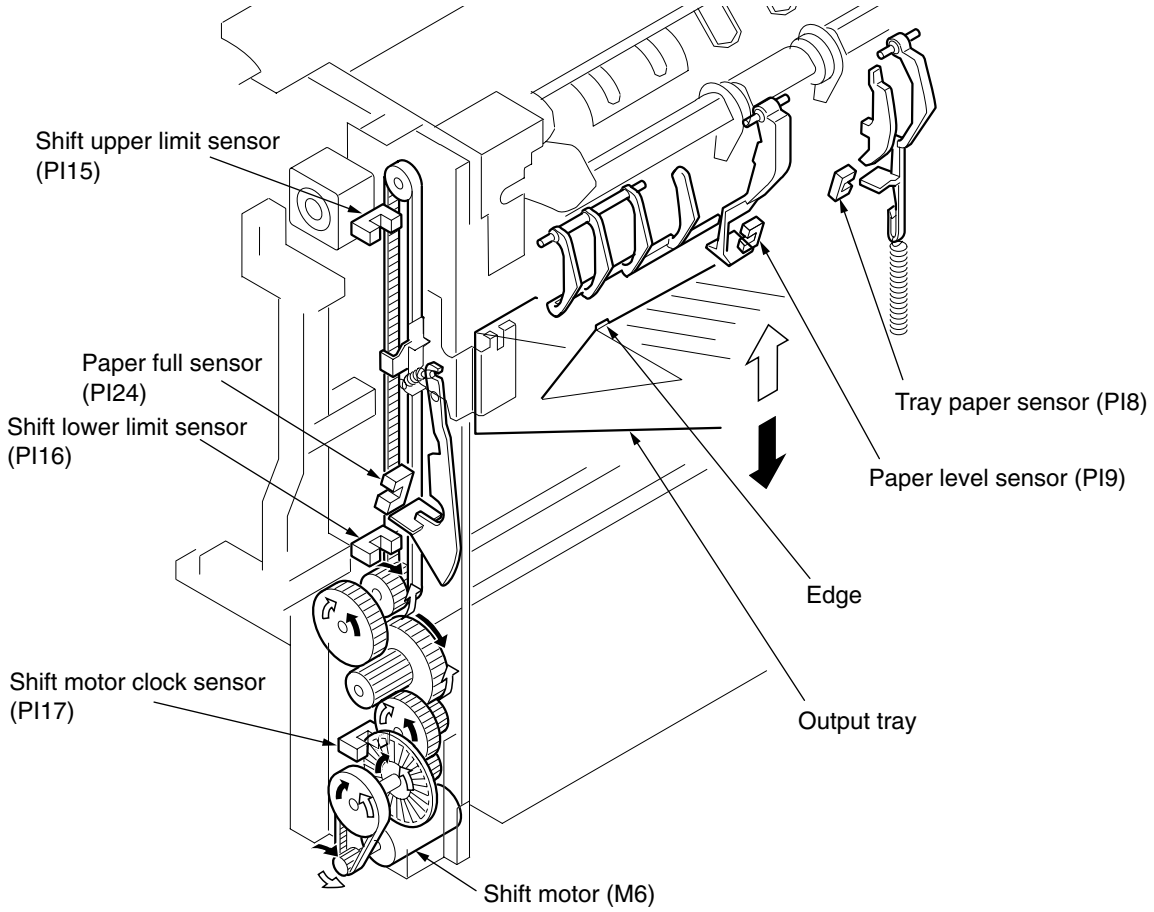


Figure 2-26

2.5 Saddle-Stitcher Unit

2.5.1 Basic Operation

2.5.1.1 Overview

The finisher, after the finisher unit has saddle-stitched a set of documents (saddle-stitch double stapling), folds the set in two and outputs it to the tray. These movements are controlled by the finisher controller circuit board in accordance with commands sent from the printer.

2.5.2 Feeding/Driving Systems

2.5.2.1 Overview

After saddle-stitching documents sent from the finisher unit in accordance with commands sent from the printer, the finisher folds the document set together and outputs the set to the booklet tray in the saddle-stitcher unit.

This movement is divided into four steps below.

1) Paper infeeding
2) Saddle-stitching
3) Multi-sheet feeding
4) Folding/output

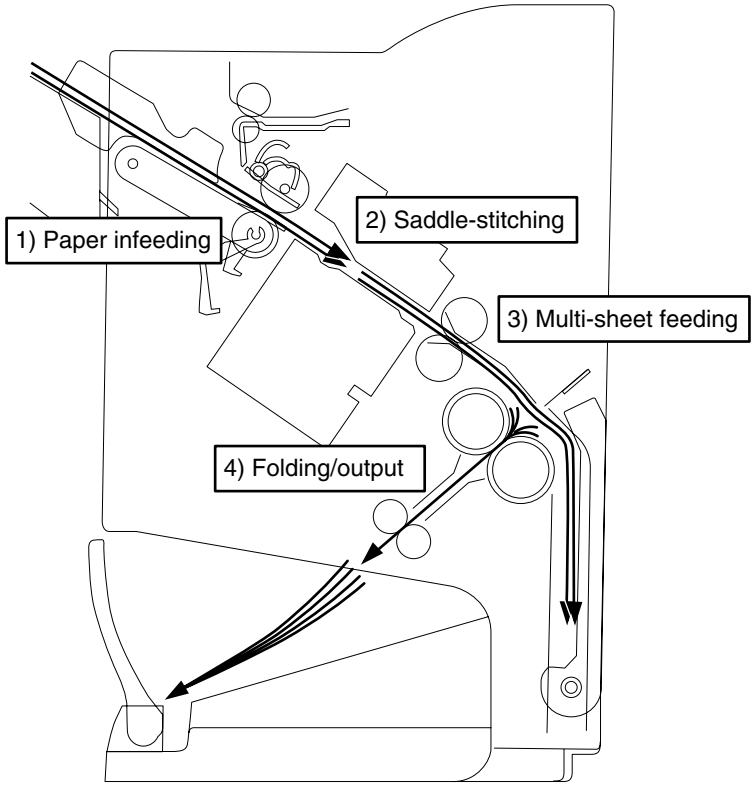


Figure 2-27

1) Paper Infeeding
A set of documents, after jogged on the jog tray, are sandwiched between the multi-sheet delivery rollers and then fed in towards the saddle-stitcher by the rotation of the multi-sheet delivery rollers.

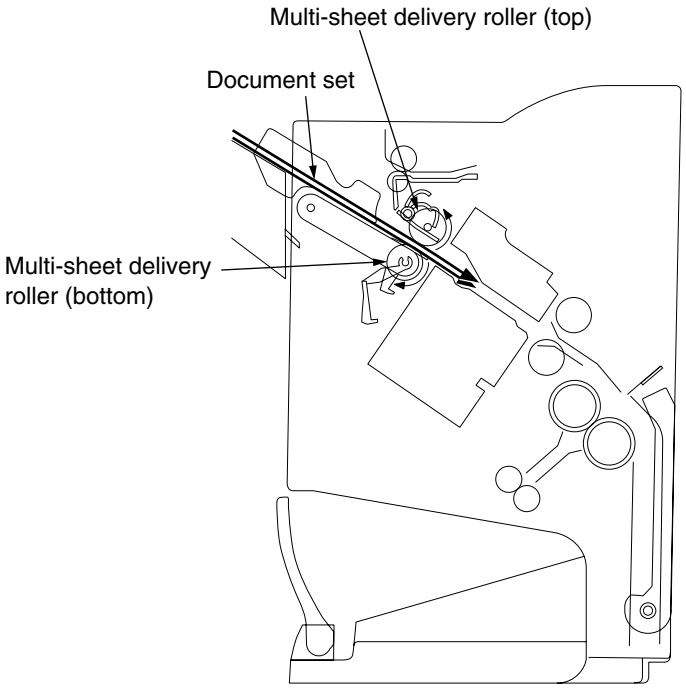


Figure 2-28

2) Saddle-Stitching
When the document set is further fed and its center (position to be saddle-stitched) reaches the stapler's staple position, the document set stops and the stapler saddle-stitches it in the center.

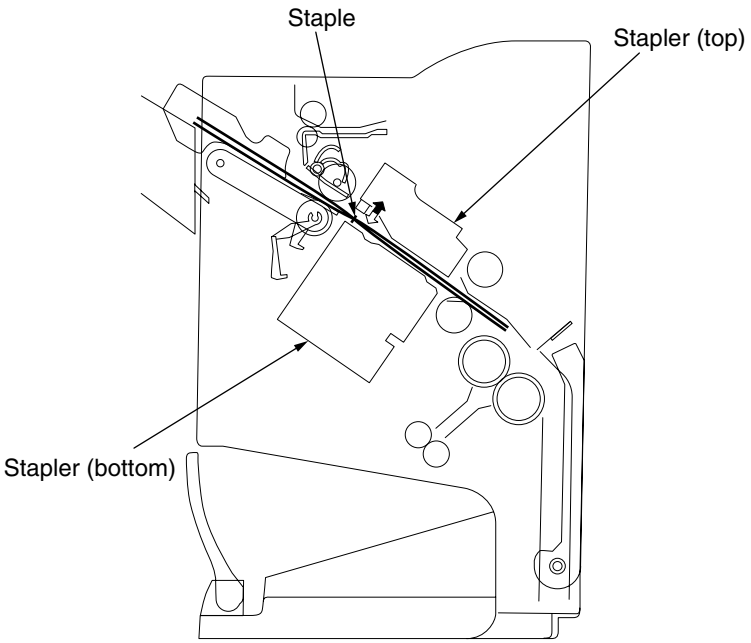


Figure 2-29

3) Multi-Sheet Feeding
The multi-sheet feed roller feds the document set into the multi-sheet folding/delivery position. The multi-sheet folding/delivery position is where the center of the document set (saddle-stitched position) is aligned with the paper pressure plate and the nip of the paper folding rollers.

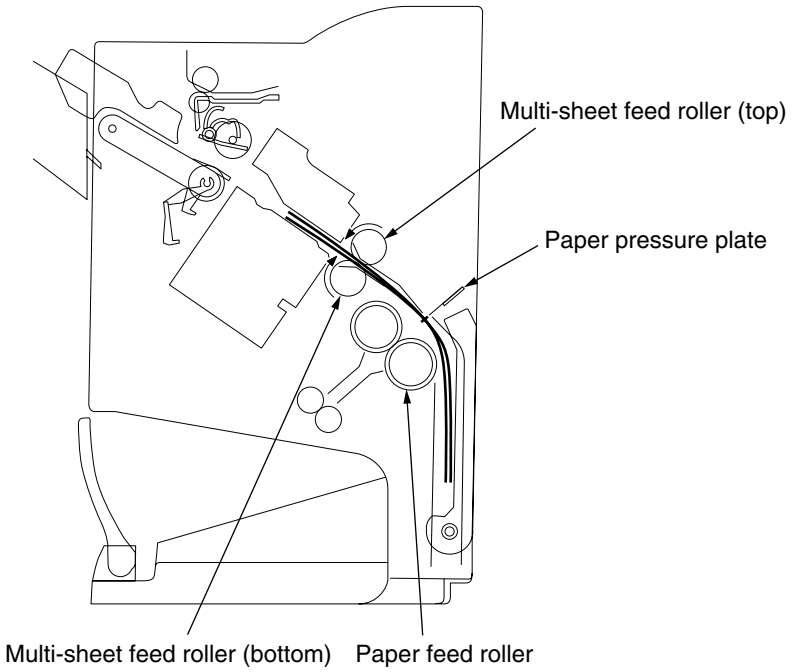


Figure 2-30

4) Folding/Output
The paper pressure plate presses the center of the document set towards the paper folding rollers. The paper folding rollers sandwich the document set and V-fold it. The paper folding rollers then the booklet delivery rollers feed the document set to the booklet tray.

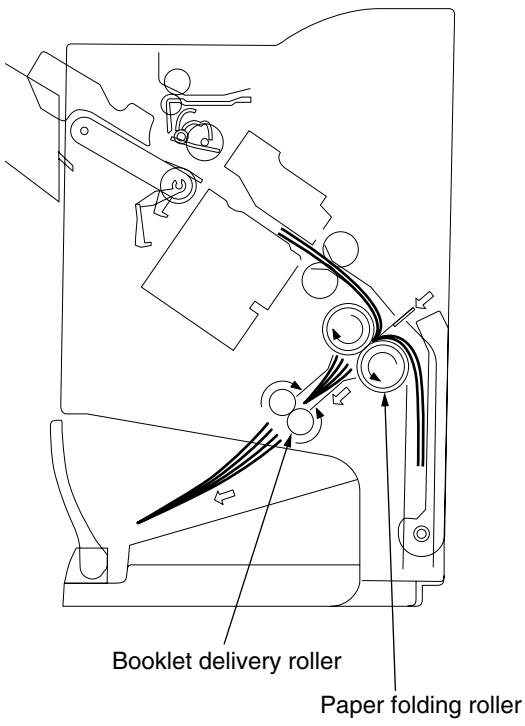


Figure 2-31

2.5.3 Paper Infeeding System

2.5.3.1 Overview

The paper infeeding system feeds further a document set sent from the finisher unit and stops it where its center (position to be saddle-stitched) in the stapler's staple position for saddle-stitching and paper folding in the next process.

Upon completion of paper stacking on the jog tray and jogging, the paddle motor (M2) begins to run backward to lower the swing guide. As the swing guide is lowered, the document set is sandwiched between the top and bottom multi-sheet delivery rollers. The delivery motor (M3) runs backward and the multi-sheet delivery rollers rotate, and the document set will be fed to the saddle-stitcher unit. When the edge of the document set reaches the fold position sensor (PI10), the finisher controller circuit board drives the delivery motor for the specified number of motor pulses and stops the center of the document set (position to be saddle-stitched) in the stapler's staple position. Before the document set passes the multi-sheet feed rollers, the multi-sheet feed roller (bottom) is rotated by the drive of the feed motor (M1) to prevent the edges of the documents from bending.

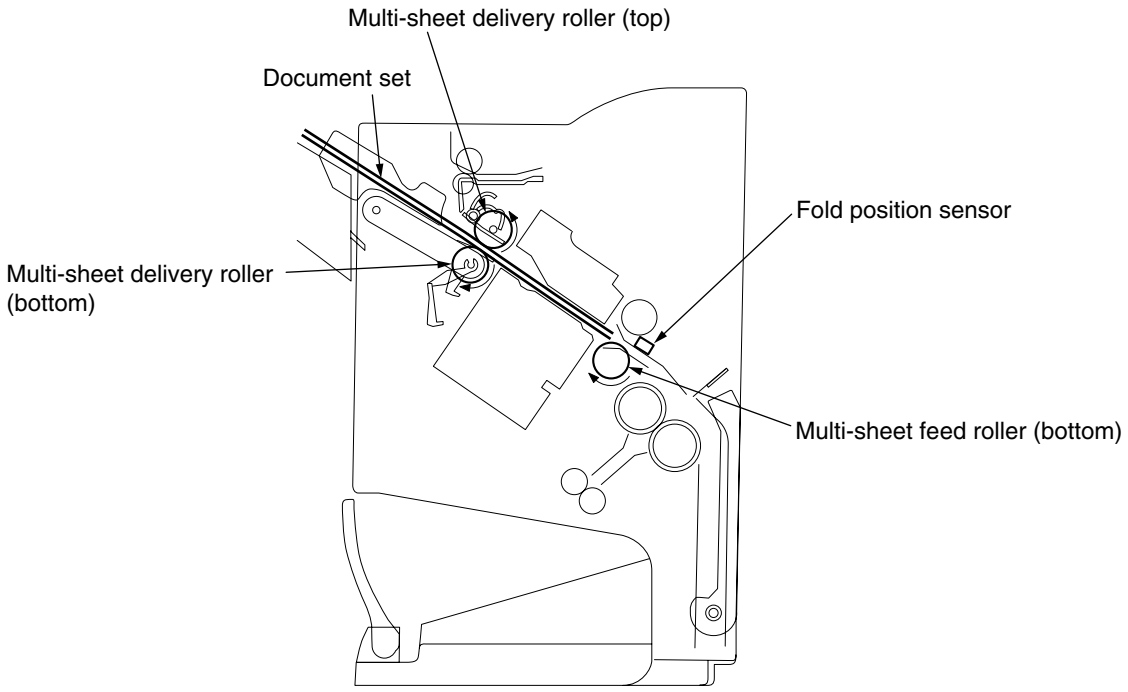


Figure 2-32

2.5.4 Multi-Sheet Feeding System

2.5.4.1 Overview

The multi-sheet feeding system feeds a saddle-stitched document set to the folding position.

Upon completion of saddle-stitching, the feed motor (M1) runs backward to lower the multi-sheet feed roller (top). The document set is sandwiched between the multi-sheet feed rollers. The booklet clutch (CL1) is turned on and the feed motor (M1) runs forward to feed the document set to the folding position. The feed distance to the folding position is determined by the number of motor pulses for which the feed motor (M1) runs.

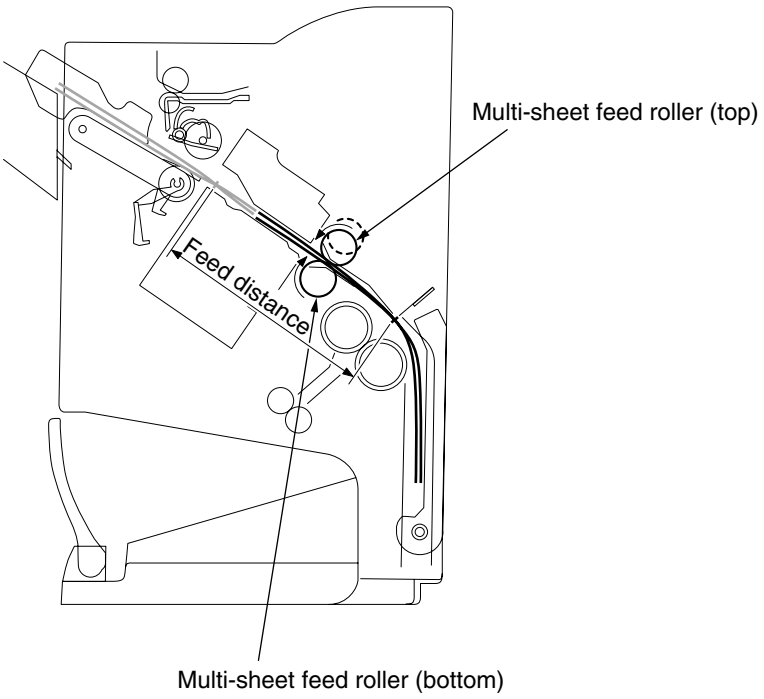


Figure 2-33

2.5.5 Folding/Output System

2.5.5.1 Overview

The paper folding mechanism consists of the guide plate, paper folding rollers, and paper pressure plate. The guide plate, paper folding rollers, and paper pressure plate are all driven by the staple/fold motor (M7) via the gears and cam. The motor driving is monitored by the staple/fold motor clock sensor (PI14).

The guide plate covers the paper folding rollers until a document set is fed into the folding position. The guide plate helps feed the documents to the saddle-stitcher and also prevents them from touching the paper folding rollers.

The folding home position sensor (PI11) is used to detect the positions of the paper folding rollers and paper pressure plate.

After V-folded by the paper folding rollers, the document set is output by the booklet delivery rollers. The booklet delivery rollers are also driven by the staple/fold motor (M7).

On the booklet tray, the booklet tray sensor (PI13) is provided. This sensor detects document sets on the tray but it doesn't detect a paper jam.

2.5.5.2 Paper Folding

Paper folding is performed by the paper folding rollers and the paper pressure plate.

As soon as the paper folding rollers begin to rotate, the paper pressure plate begins to move and pushes the document set into the nip of the paper folding rollers. When the paper folding rollers continue to rotate and the document set is sandwiched approximately 10 mm between the paper folding rollers, the paper pressure plate returns to home position. The document set sandwiched between the paper folding rollers is delivered by the paper folding rollers and then by the booklet delivery rollers to the booklet tray.

One semicircular part of each paper folding roller is made hollow except for the center and both ends of the roller. This hollow semicircular parts of the top and bottom paper folding rollers touch each other only in the center and on both ends. This makes the rollers do paper feeding only and prevents crease in the paper. The other semicircular parts of the top and bottom paper folding rollers touch each other fully. Paper folding begins on these surfaces. The rollers feed the document set while folding it.

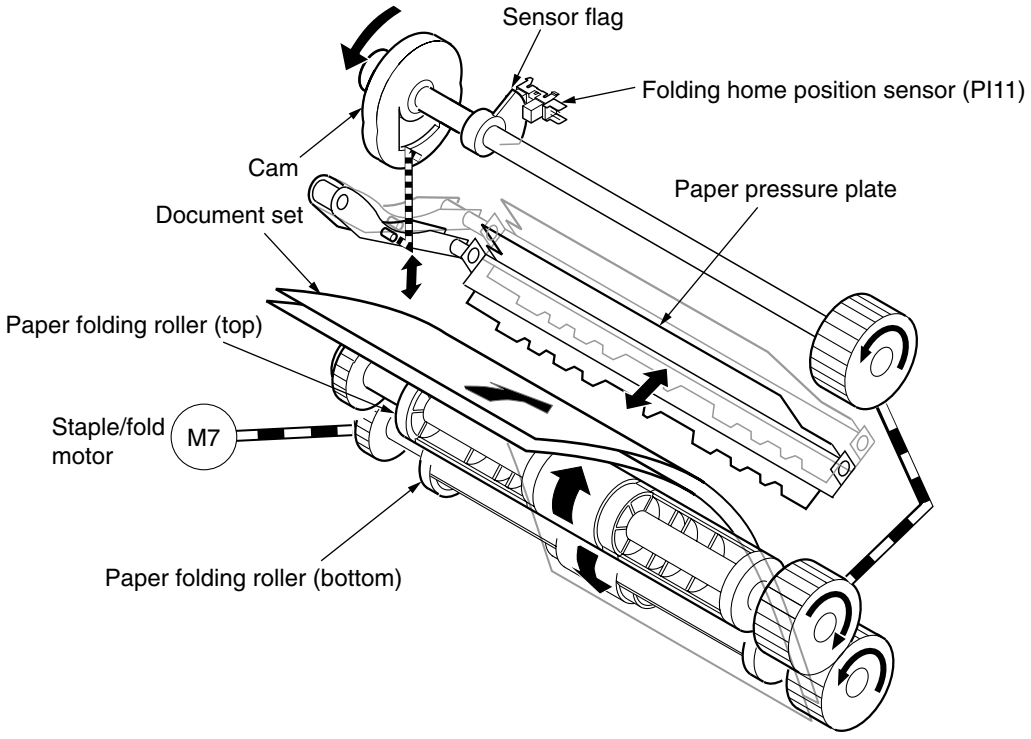


Figure 2-34 (1/4)

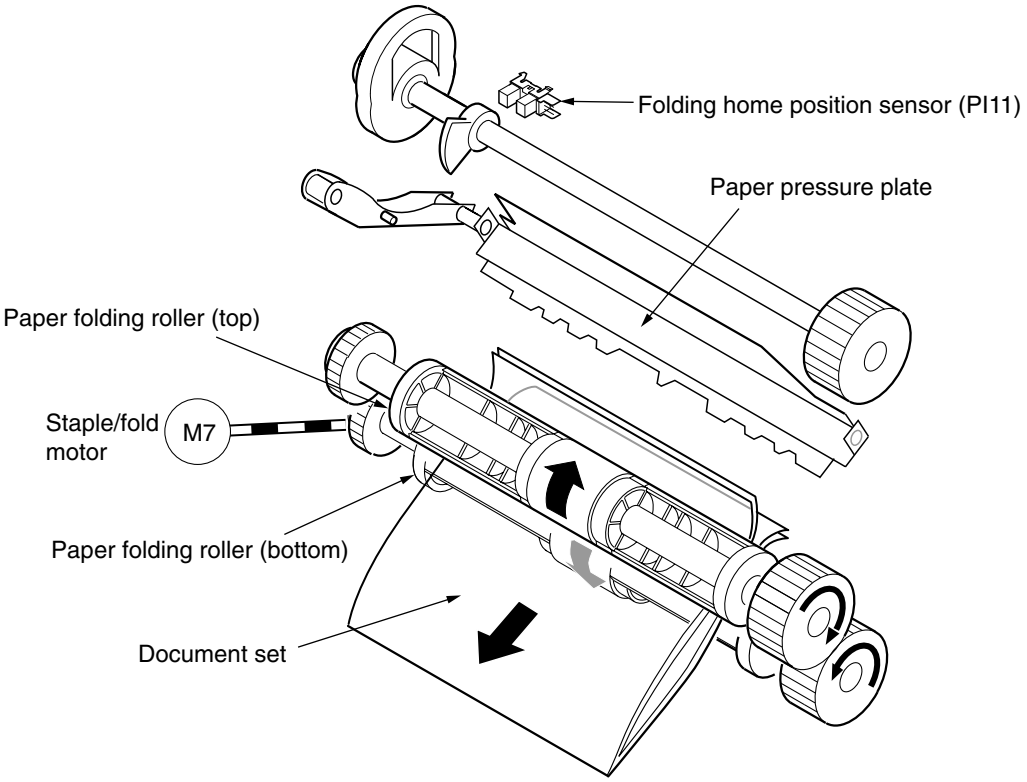


Figure 2-34 (2/4)

[Paper Folding Start Position]

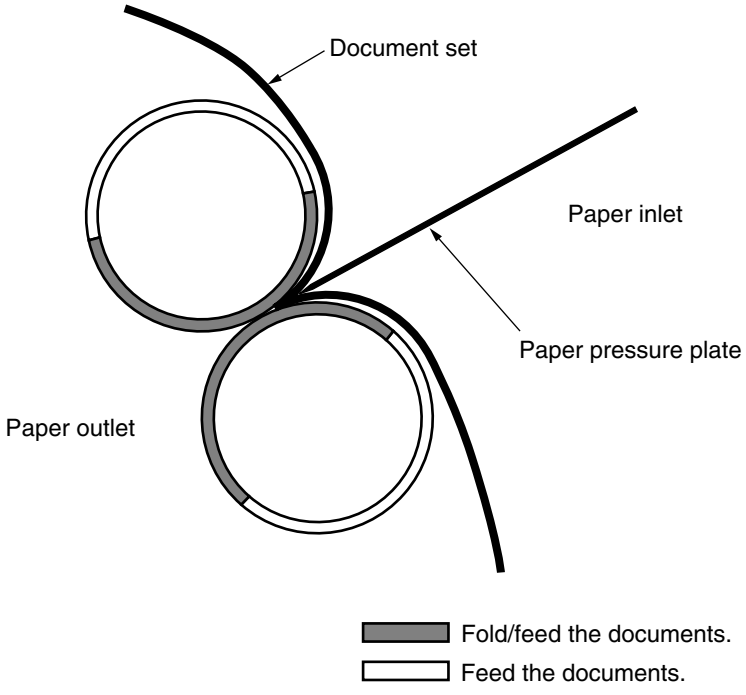


Figure 2-34 (3/4)

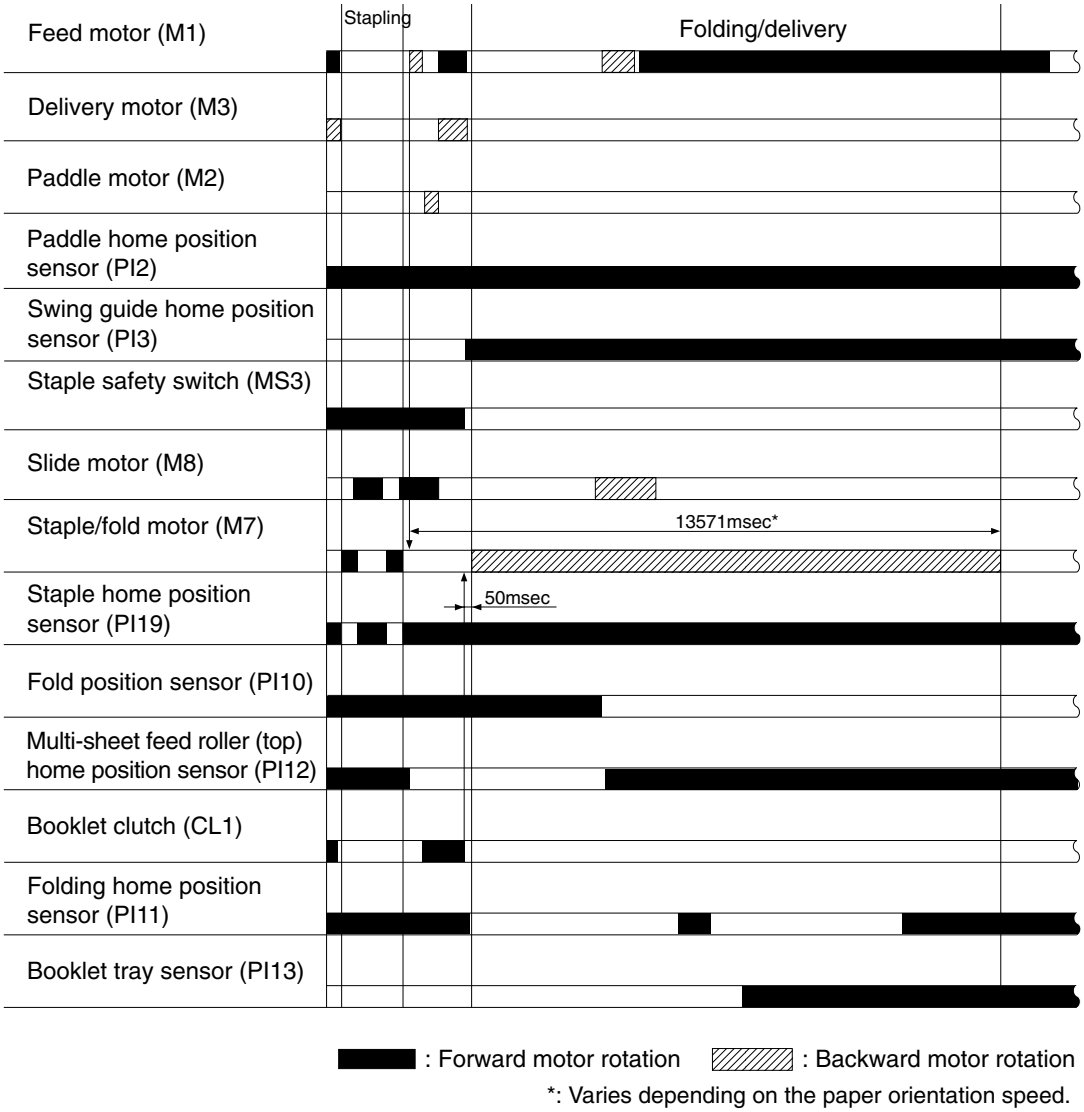


Figure 2-34 (4/4)

2.6 Puncher Unit (Optional)

2.6.1 Basic Operation

2.6.1.1 Overview

The optional puncher unit is installed in the paper feeder of the finisher. The puncher unit doesn't have a paper feeding mechanism. Paper sent from the connected machine passes the puncher unit and then it is fed by the finisher feeding system. When the tail end of the paper reaches the puncher unit, paper stops temporarily. The punch shaft rotates and the puncher punches the paper at its tail. These movements are controlled by the punch controller circuit board and commands from the finisher controller circuit board.

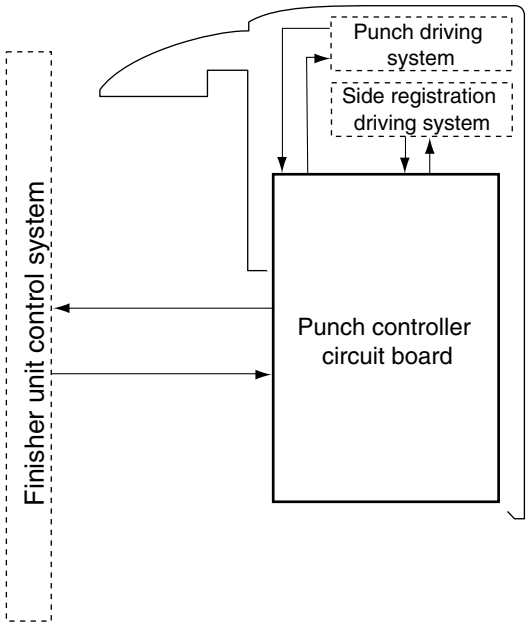


Figure 2-35

2.6.2 Punching

2.6.2.1 Overview

The puncher unit is installed in the paper feeder of the finisher and it punches holes in paper when the paper sent from the connected machine stops temporarily. When the tail end of the paper reaches the puncher unit, the inlet roller of the finisher unit stops the paper and the puncher punches the paper at its tail.

The puncher unit consists of the die and the punch (punch blade). The punch is driven by the punch motor (M1P). The punch is fastened to the eccentric cam of the punch shaft. The rotational motion of the punch shaft is converted to the reciprocating motion for punching.

The punch motor (M1P) is a DC motor. The home position of the punch shaft is detected by the punch home position sensor (PI1P). In order to stop the DC punch motor accurately in home position, the punch motor clock sensor (PI3P) counts the number of clock signals. When it reaches the specified number, the punch motor is stopped. As the punch shaft rotates 180 degrees from home position, the puncher makes the punching movement once.

In the inlet paper feeding path of the puncher unit, five light receiving transistors (photo sensor circuit board) are installed at the top and five LED (LED circuit board) are installed at the bottom. These serve as five sensors. The front pair (LED5 and PT5) is the paper end sensor and used for detecting the tail end of paper. The remaining 4 pairs (LED1 to LED4 and PT1 to PT4) are the side registration sensors and used for detecting the rear of paper to determine the punching position.

The punch motor, punch and the sensors above make up the punch slide unit. The unit moves forward and backward according to paper size. This movement is driven by the side registration motor (M2P). The home position of the punch slide unit is detected by the side registration home position sensor (PI2P). The side registration motor (M2P) is a stepping motor.

Driving of the punch motor and the side registration motor is controlled by the punch controller circuit board and commands sent from the finisher controller circuit board.

Punch dust is collected in the punch dust receptacle. Whether the receptacle is full is detected by the LED 121 on the dust full LED circuit board and PT131 on the dust full photo sensor circuit board.

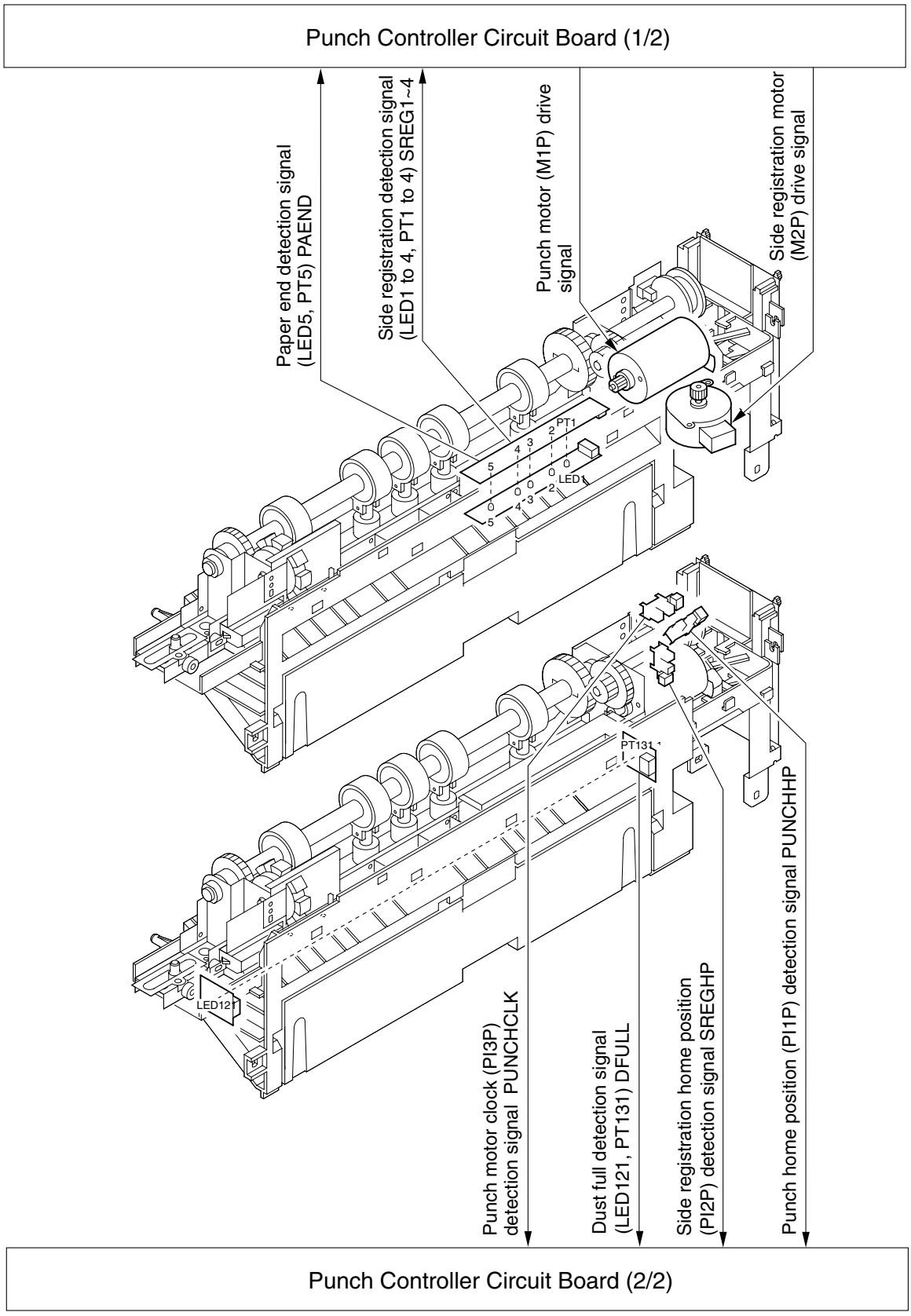

Punch Controller Circuit Board (1/2)
Paper end detection signal (LED5, PT5) PAEND
Side registration detection signal (LED1 to 4, PT1 to 4) SREG1~4
Punch motor (M1P) drive signal
Side registration motor (M2P) drive signal
PT1
LED1
PT131
LED121
Punch motor clock (PI3P) detection signal PUNCHCLK
Dust full detection signal (LED121, PT131) DFULL
Side registration home position (PI2P) detection signal SREGHP
Punch home position (PI1P) detection signal PUNCHHP
Punch Controller Circuit Board (2/2)

Figure 2-36

2.6.2.2 Punching

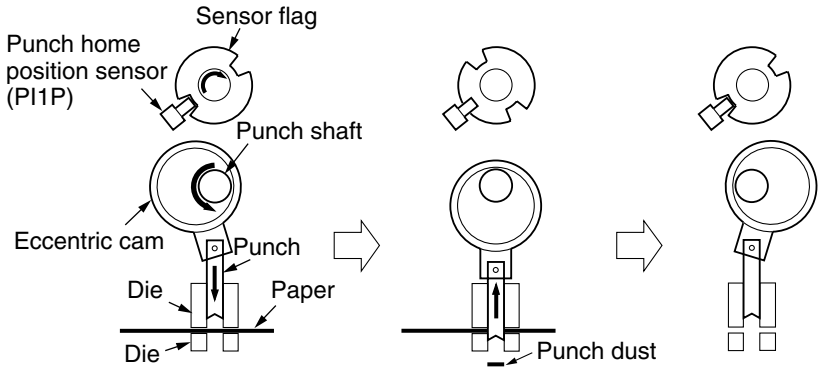
The punch is driven by the punch motor (M1P). The home position of the punch is detected by the punch home position sensor (PI1P).

There are four types of puncher units; J1 for 2 holes, K1 for 2/3 holes, G1 and H1 for 4 holes. With the 2-hole and 4-hole puncher units, the punch is reciprocated once for punching as the punch shaft is rotated 180 degrees from home position. Also with the 2/3-hole puncher unit, the punch is reciprocated once for punching as the punch shaft is rotated 180 degrees from home position. Only a semicircular part of the punch shaft is used for 2-hole punching and the other semicircular part is used for 3-hole punching.

1) 2-Hole and 4-Hole Puncher Units
The puncher unit is in home position, when the punch home position sensor is on. Punching of the first sheet is completed, when the punch shaft rotates 180 degrees forward and the punch home position sensor is turned on. Punching of the second sheet is completed, when the punch shaft rotates 180 degrees backward and the punch home position sensor is turned on.

The puncher unit works as shown below to punch two sheets of paper.

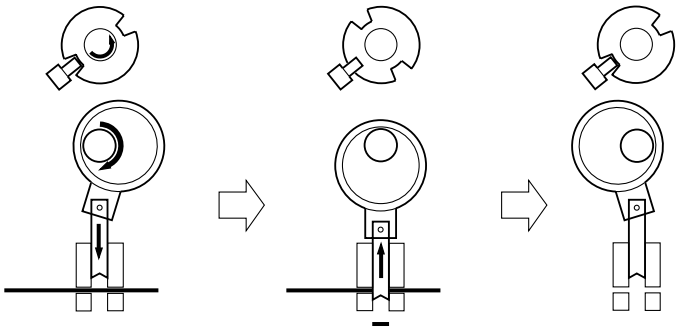
a) Punching a Hole in the First Sheet at Its Tail



[Punch shaft at a standstill/ Home position] [Punch shaft 90 degrees forward/A punch hole is made.] [Punch shaft 180 degrees forward/Punching is completed.]

Figure 2-37 (1/2)

b) Punching a Hole in the Second Sheet at Its Tail



[Punch shaft at a standstill/ Home position] [Punch shaft 90 degrees backward/A punch hole is made.] [Punch shaft 180 degrees backward/Punching is completed.]

Figure 2-37 (2/2)

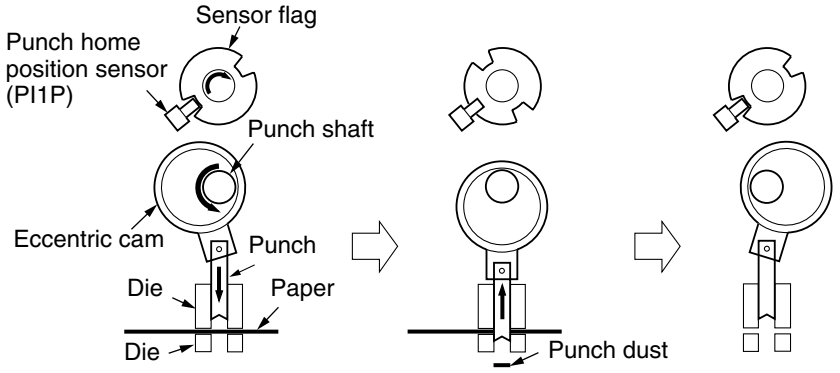
2) 2-Hole/3-Hole Puncher Unit

The puncher unit is in home position, when the punch home position sensor is on. When two punch holes are to be made, punching of the first sheet is completed, when a semicircular part of the punch shaft rotates 180 degrees forward and the punch home position sensor is turned on. On the other semicircular part of the punch shaft, the 3-hole punch is reciprocated once in the direction away from the paper (ascending direction).

Punching of the second sheet is completed, when the former semicircular part of the punch shaft rotates 180 degrees backward and the punch home position sensor is turned on. On the other semicircular part of the punch shaft, again, the 3-hole punch is moved in the direction away from the paper (ascending direction). When three holes are to be made, the 2-hole punch is reciprocated once in the direction away from the paper (ascending direction).

The puncher unit works as shown below to punch two holes in two sheets of paper.

a) Punching a Hole in the First Sheet at Its Tail



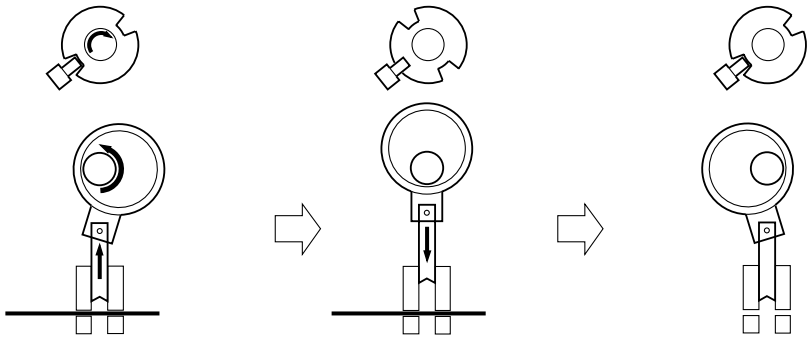
[Punch shaft at a standstill/ Home position]

[Punch shaft 90 degrees forward/A punch hole is made.]

[Punch shaft 180 degrees forward/Punching is completed.]

Figure 2-38 (1/4)

When two holes are made, the 3-hole punch is reciprocated in the direction away from the paper (ascending direction) as shown below.



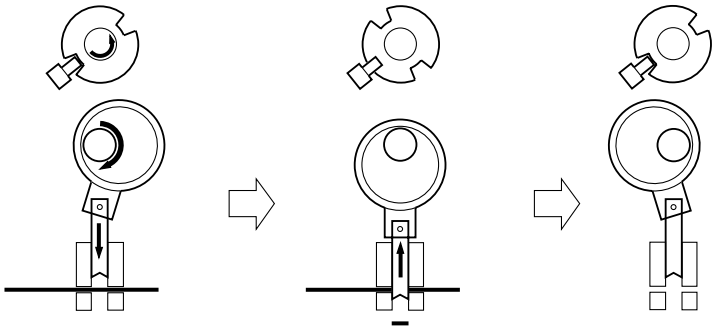
[Punch shaft at a standstill/ Home position]

[Punch shaft 90 degrees forward/Punch ascends to its highest position.]

[Punch shaft 180 degrees forward/Punch returns.]

Figure 2-38 (2/4)

b) Punching a Hole in the Second Sheet at Its Tail



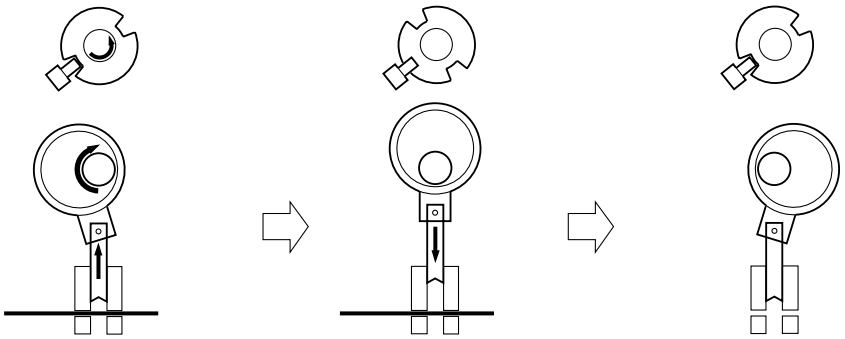
[Punch shaft at a standstill/ Home position]

[Punch shaft 90 degrees backward/A punch hole is made.]

[Punch shaft 180 degrees backward/Punching is completed.]

Figure 2-38 (3/4)

When two holes are made, the 3-hole punch is reciprocated in the direction away from the paper (ascending direction) as shown below.



[Punch shaft at a standstill/ Home position]

[Punch shaft 90 degrees backward/Punch ascends to its highest position.]

[Punch shaft 180 degrees backward/Punch returns.]

Figure 2-38 (4/4)

2.6.2.3 Side Registration

The side registration of the punch slide unit is driven by the side registration motor (M2P). The home position of the punch slide unit is detected by the side registration home position sensor (PI2P). The punch slide unit detects the edges of paper using the paper end sensor (LED5 and PT5) and the side registration sensors (LED1 to LED4 and SREG1 to SREG4) and moves to an appropriate position at the tail of the paper for the paper size.

The side registration is performed as shown below.

1) Once the leading edge of the paper from the connected device is detected by the rear edge sensor (LED5, PT5) on the puncher unit and the specified time has elapsed, the horizontal resist motor (M2P) starts to move the punch slide unit forward.

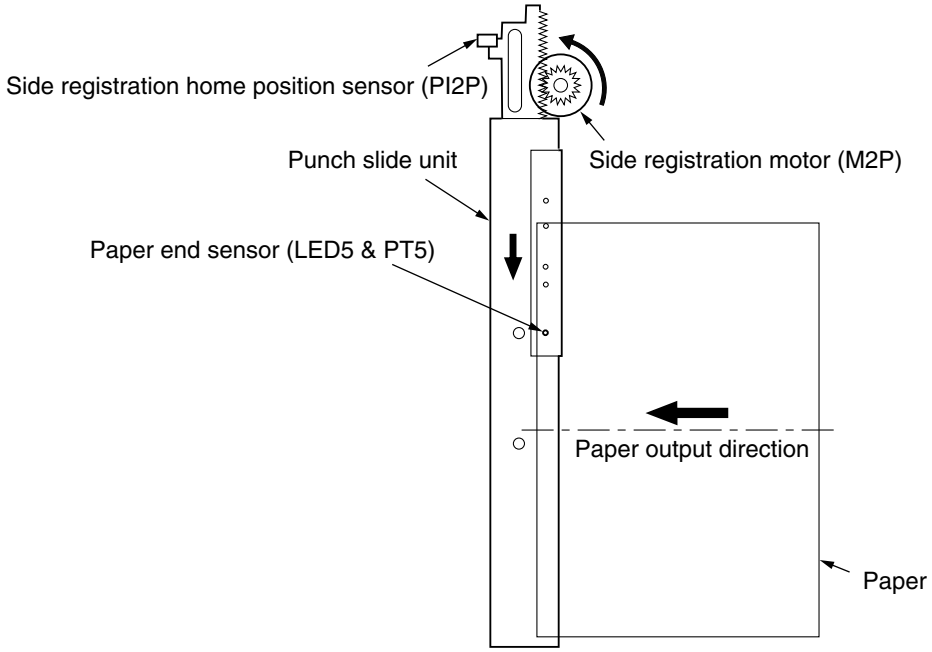


Figure 2-39

2) The appropriate side registration sensor (LED1 to 4, PT1 to 4) for the paper size signal sent from the connected machine detects the edge of the paper in the rear. The side registration motor (M2P) drives the punch slide unit further towards the front and stops it in the specified position.

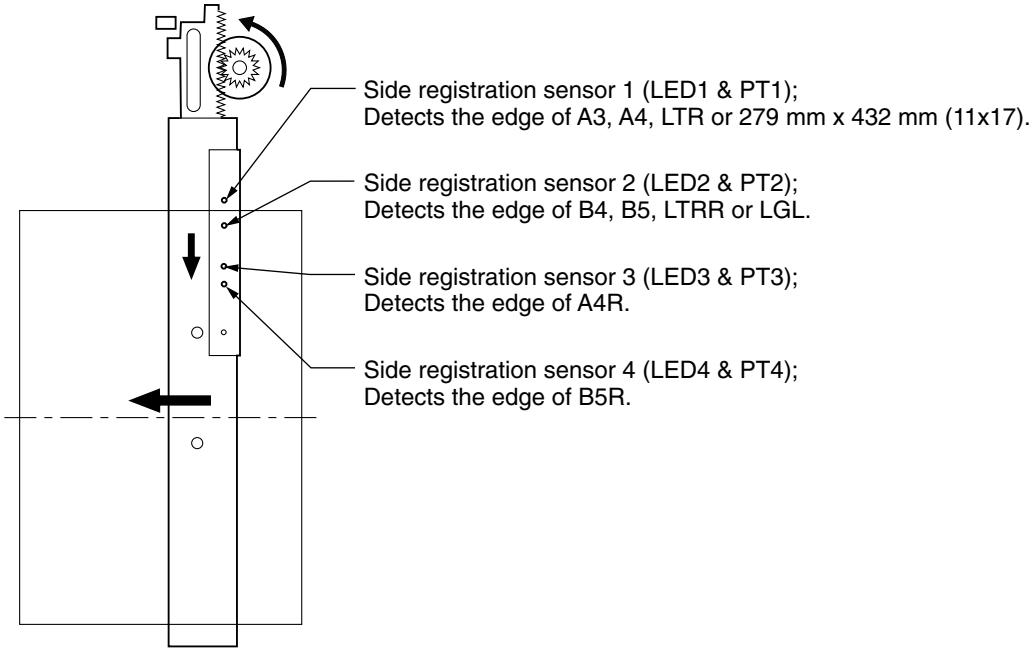

Side registration sensor 1 (LED1 & PT1);
Detects the edge of A3, A4, LTR or 279 mm x 432 mm (11x17).
Side registration sensor 2 (LED2 & PT2);
Detects the edge of B4, B5, LTRR or LGL.
Side registration sensor 3 (LED3 & PT3);
Detects the edge of A4R.
Side registration sensor 4 (LED4 & PT4);
Detects the edge of B5R.

Figure 2-40

3) When the paper end sensor (LED5 and PT5) detects the tail end of paper, the feed motor (M1) of the finisher unit stops running and the paper stops. The punch motor (M1P) begins to run and the paper is punched.

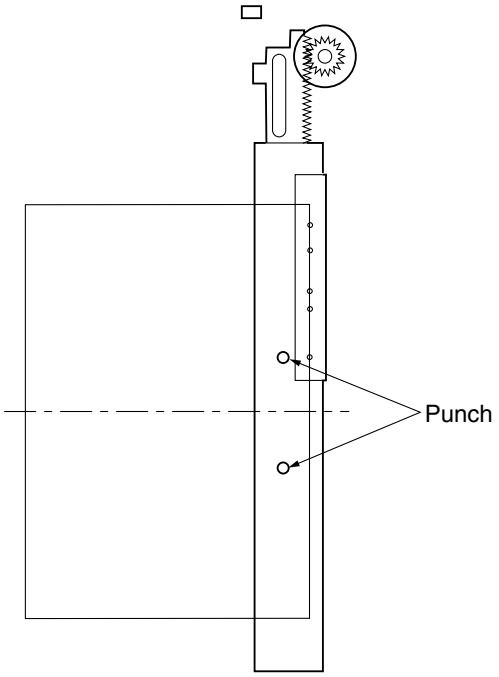


Figure 2-41

4) After punching has been completed, the feed motor (M1) of the finisher unit begins to run. At the same time, the side registration motor (M2P) runs backward to return the punch slide unit to home position and stop the unit.

5) If documents come in succession, the punch slide unit returns to home position and repeats the steps 1 to 4 for every document.

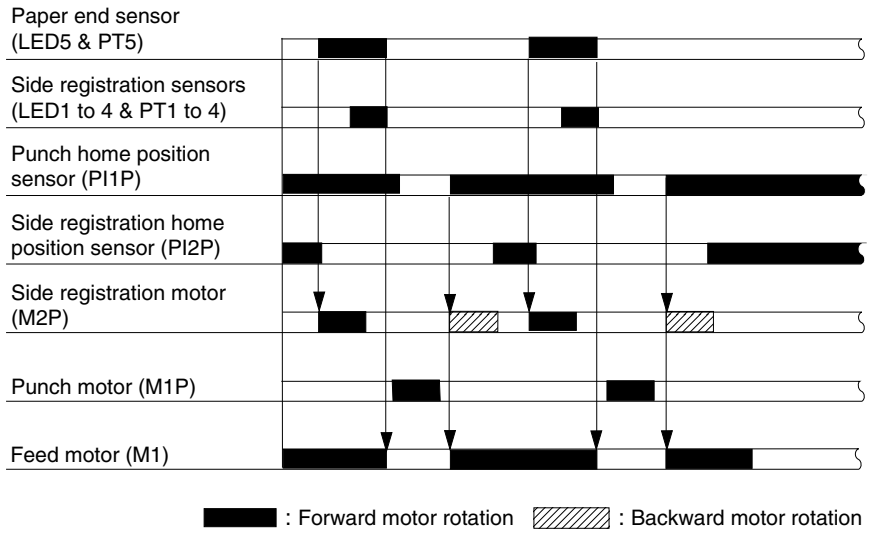
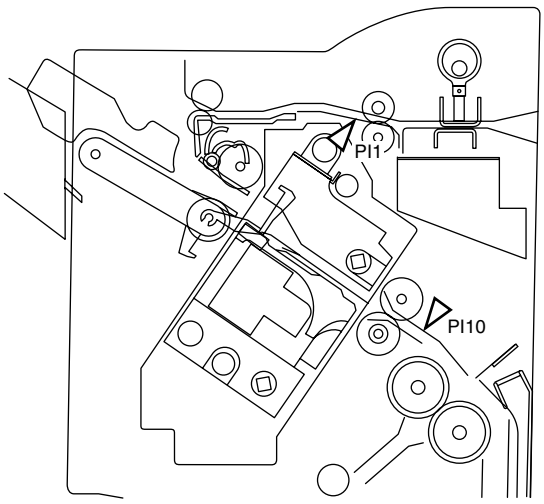


Figure 2-42

2.7 Jam Detection

2.7.1 Overview

Check timings for detection of a jam in the finisher, saddle-stitcher or puncher (optional) unit are stored in the microcomputer (CPU) on the finisher controller circuit board. The finisher controller circuit board sees whether there is paper at sensors at these timings to determine that a paper jam has occurred. If a jam has occurred, the finisher controller circuit board transmits a code for the jam to the connected machine. The code is viewed in the service mode on the connected machine.



PI1: Inlet sensor
PI10: Fold position sensor

Figure 2-43

2.7.1.1 Paper Delay Jam at Inlet Sensor (1011)

About 10 seconds have passed since the delivery signal was sent from the connected machine but the inlet sensor hasn't detected paper.

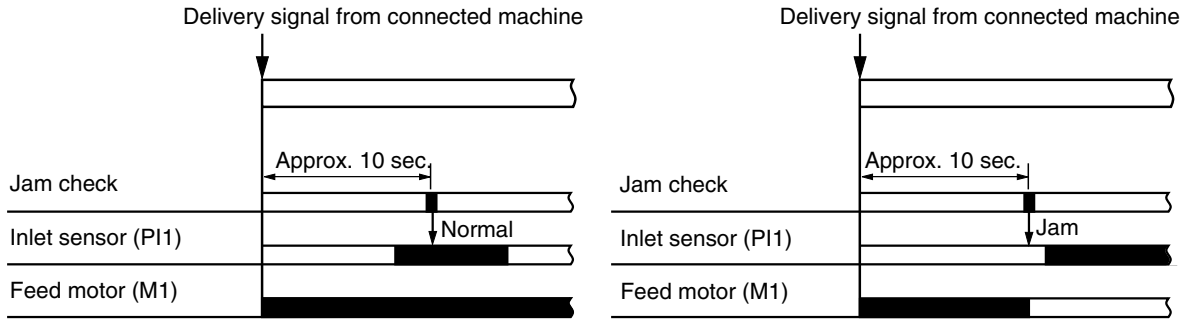


Figure 2-44

2.7.1.2 Paper Stopped Jam at Inlet Sensor (1021)

If the paper does not pass the inlet sensor within approximately 0.85 seconds of the rear edge arriving at the connection position of the finisher and main unit.

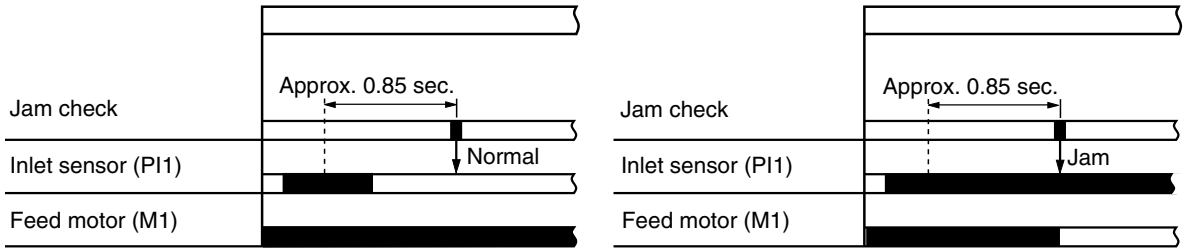


Figure 2-45

2.7.1.3 Paper Delay Jam at Fold Position Sensor (1012)

Some 1200 ms have passed since the finisher began to feed paper from the jog tray to the saddle-stitcher during saddle-stitch operation but the fold position sensor hasn't detected paper.

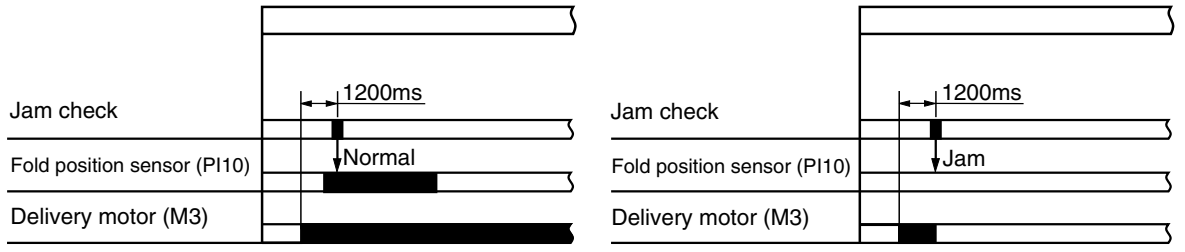


Figure 2-46

2.7.1.4 Paper Stopped Jam at Fold Position Sensor (1022)

About 10.5 seconds have passed since the staple/fold motor began to run during saddle-stitch operation but paper hasn't left the fold position sensor.

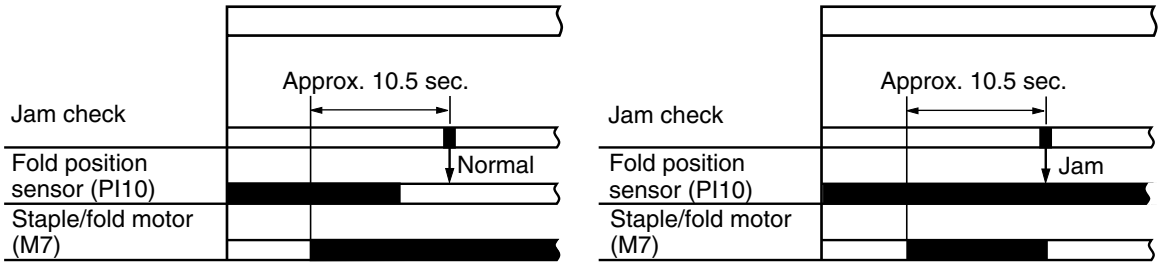


Figure 2-47

2.7.1.5 Residual Jam (1007)

If paper is detected inside the finisher when the power is turned on or when initialization has begun

Residual jams include inlet-feed-unit residual jams, processing-unit residual jams, and folding-unit residual jams.

2.7.1.6 Door Open Jam (1008)

The finisher is disconnected from the printer, or the front door or the top cover is opened during operation (paper is being fed).

2.7.1.7 Staple Jam (1006)

Some 600 ms have passed since the stapler was driven but the staple home position sensor (PI19) hasn't switched off or the stapler hasn't returned to home position (the position in which the sensor is turned on).

2.7.1.8 Non-ejection Jam

This occurs when the paper-ejection belt does not return to the home position within approximately 3 seconds after the paper-ejection motor has started, or when the home position has not been reached within approximately 1.1 seconds after tray ejection and the consequent operation of the paper-ejection motor.

2.8 Power Supply System

2.8.1 Finisher/Saddle-Stitcher Unit

2.8.1.1 Overview

When power of the inverter is turned on, 24 VDC is supplied to the finisher controller circuit board from the inverter. Voltage of 24 V DC is used to drive the motor clutch and to generate 5 V DC, which in turn is used to drive the ICs on the sensor circuit boards. The 5 V is also used to power the punch-controller circuit board when the optional puncher unit is installed.

The 24 VDC for driving some of the motors will be shut off, if the joint switch (MS2), the front door switch (MS1) or the staple safety switch (MS3) is turned off.

Figure 2-48 shows a block diagram of the power supply.

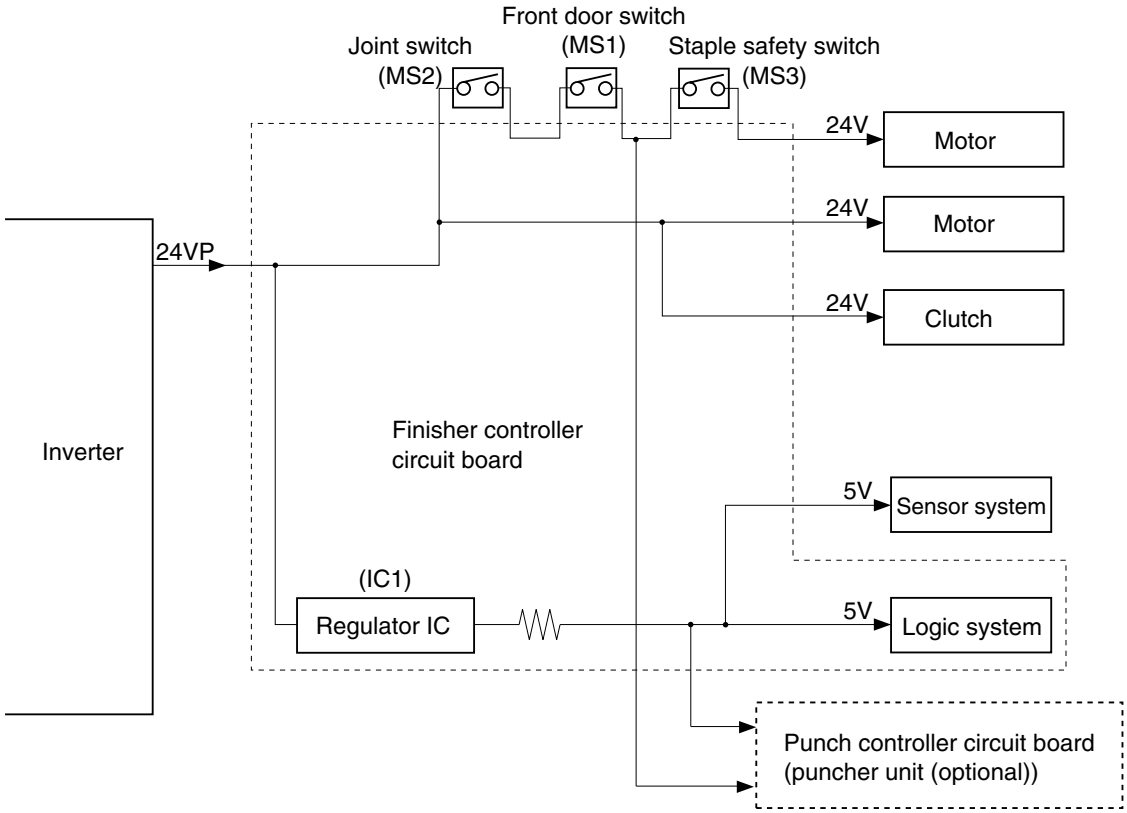


Figure 2-48

2.8.1.2 Protective Function

The 24-V drive units, including the feed motor (M1), paddle motor (M2), and paper-ejection motor (M3), incorporate fuses that trip if an overcurrent flows.

2.8.2 Puncher Unit (Optional)

2.8.2.1 Overview

The voltages of 24 V and 5 V are supplied to the puncher unit, when power of the inverter is turned on. The 24 V power supply is used for driving the motors. The 5 V power supply is used for driving the sensors and the ICs on the punch controller circuit board.

The 24 V power supply for the motors won't be supplied, if the joint switch (MS2) or front door switch (MS1) of the finisher unit is off.

Figure 2-49 shows a block diagram of the power supply.

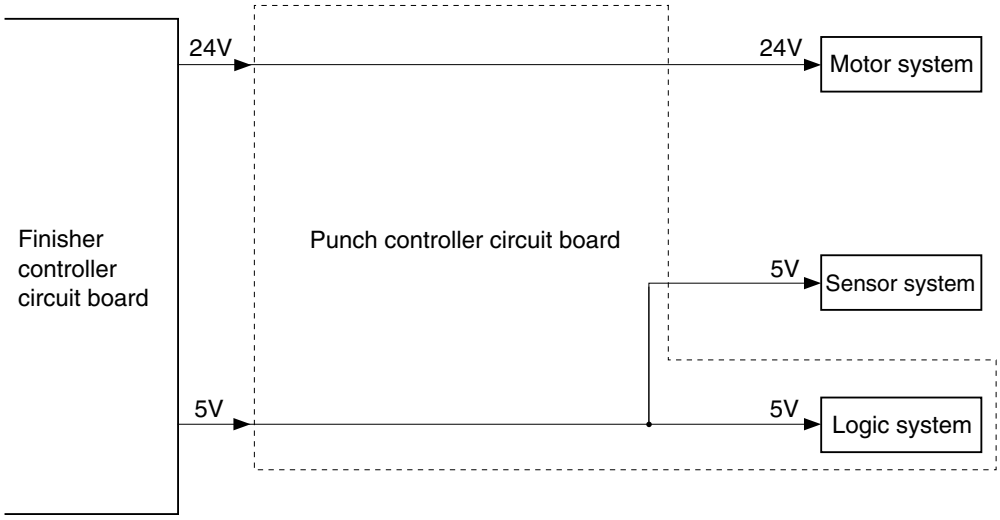


Figure 2-49

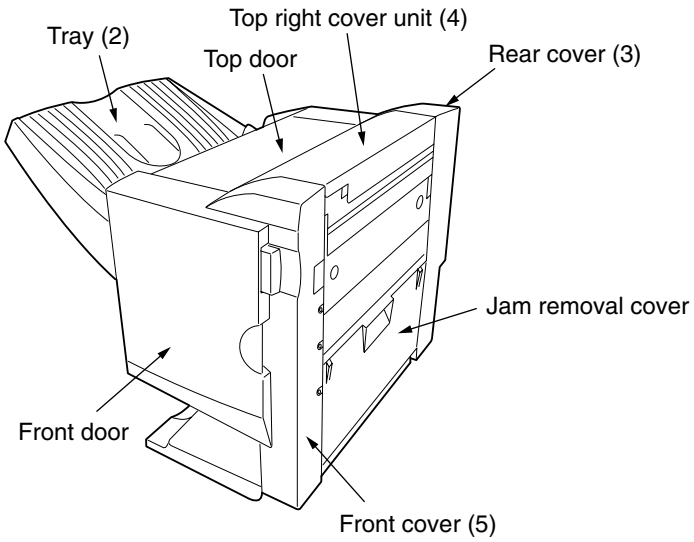
2.8.2.2 Protective Function

Fuses are built in for the 24 V power supply for driving the punch motor (M1P) and the side registration motor (M2P). If an excessive current flows, the fuses will be blown.

3. PARTS REPLACEMENT

3.1 Finisher/Saddle-Stitcher Unit

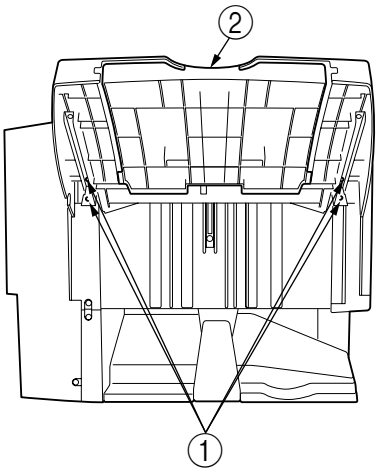
3.1.1 Exterior Controlling Parts



A number in parentheses represents the number of screws.

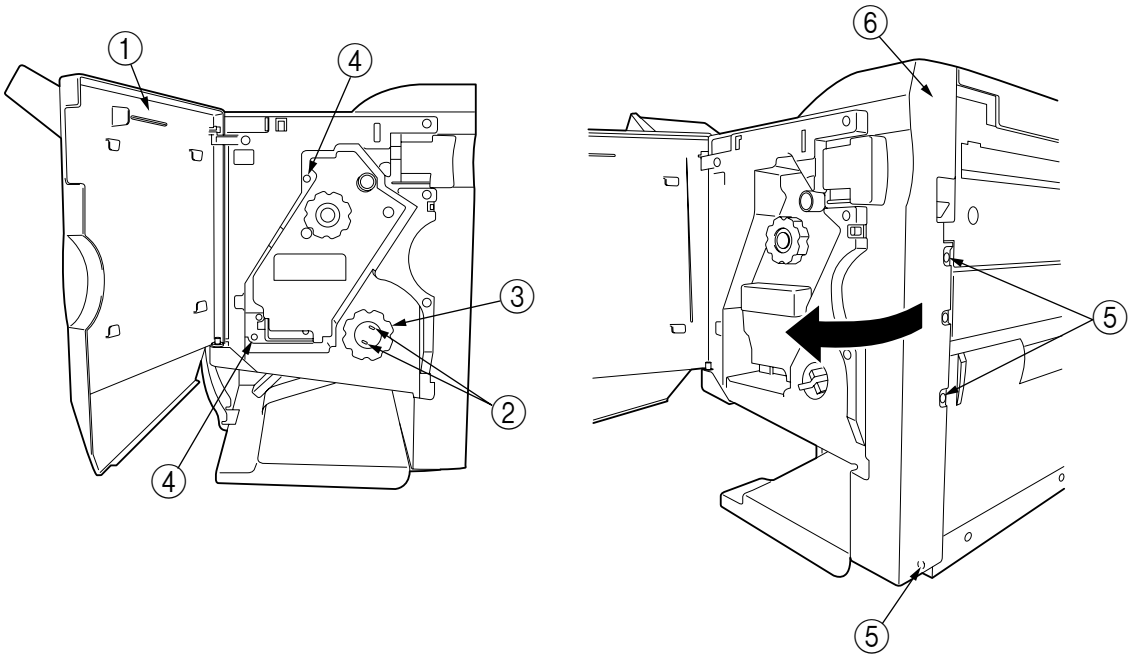
3.1.1.1 Removing Output Tray

1) Remove the four screws ① and remove the output tray ②.



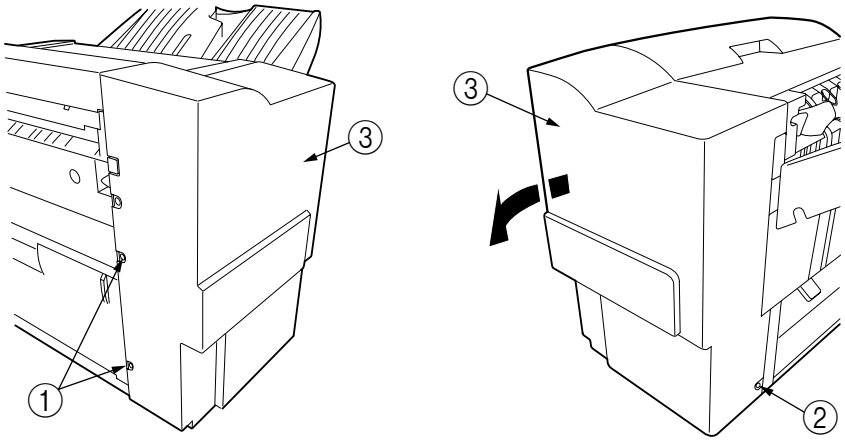
3.1.1.2 Removing Front Cover

1) Open the front door ①.
2) While holding the claws ②, remove the fold jam removal dial ③.
3) Remove the two screws ④.
4) Remove the three screws ⑤ and remove the front cover ⑥.



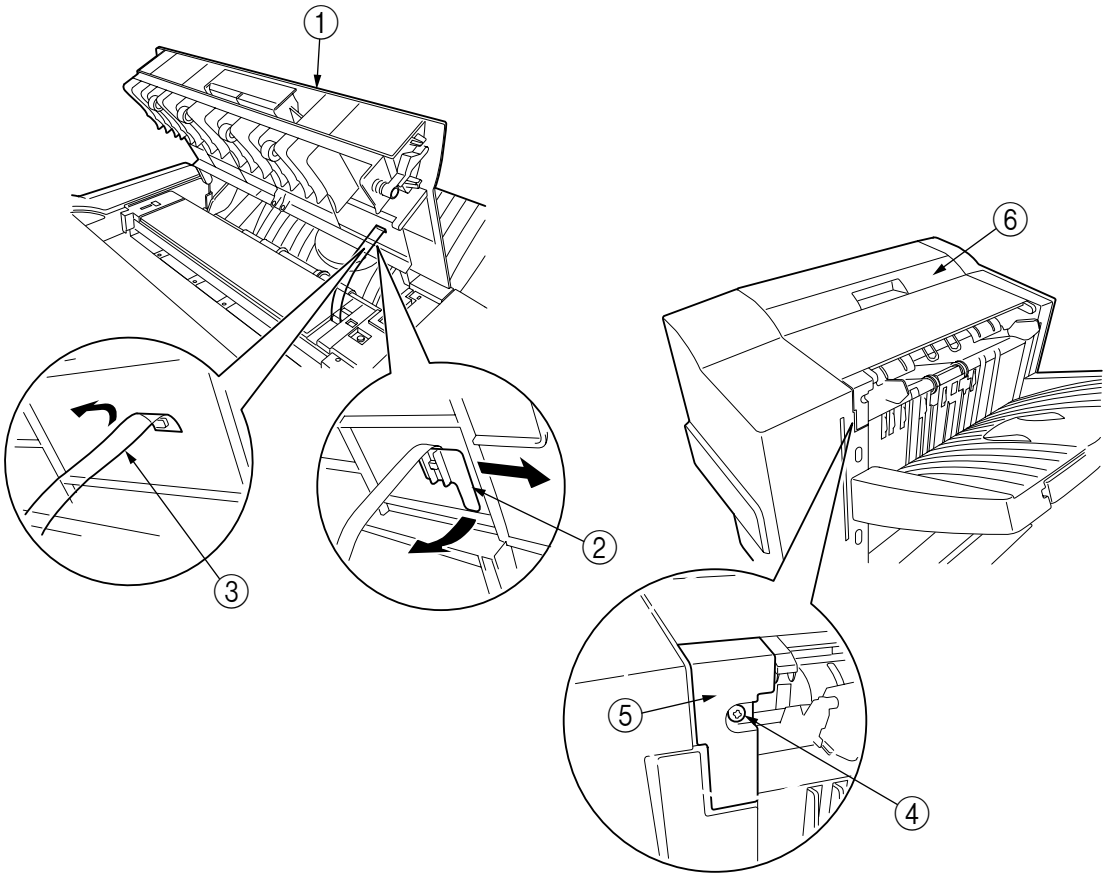
3.1.1.3 Removing Rear Cover

1) Remove the two screws ① on the paper feed side and the screw ② on the delivery side. Remove the rear cover ③.



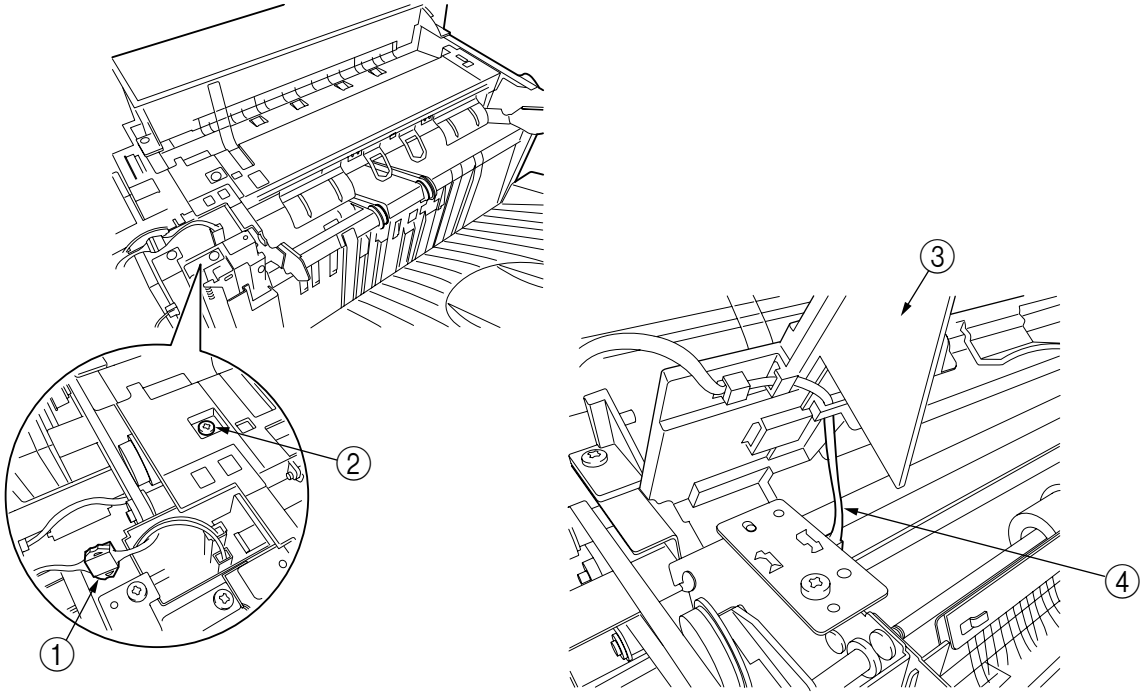
3.1.1.4 Removing Top Cover

1) Open the top cover ①. Turn the cover band clip ② clockwise and remove the clip.
2) Remove the cover band ③.
3) Remove the screw ④, the jog tray rear cover ⑤ and then the top cover ⑥.



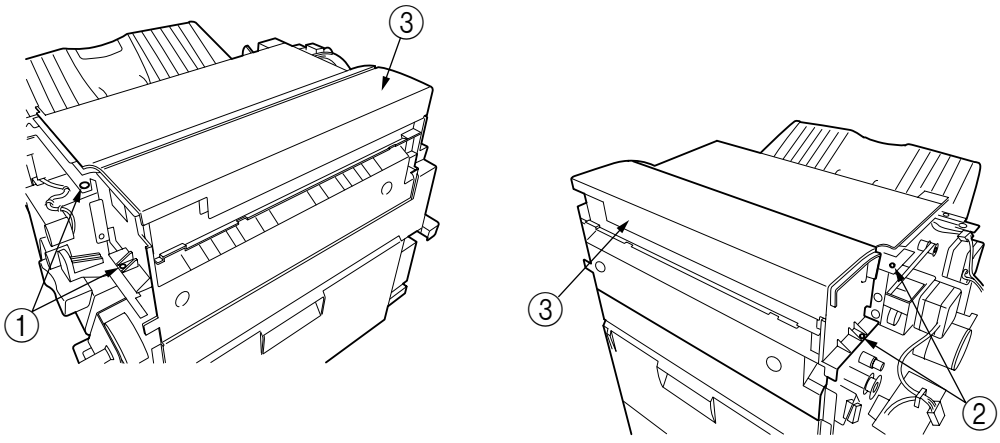
3.1.1.5 Removing Jog Tray Top Cover

1) Remove the front cover. (See 3.1.1.2.)
2) Remove the rear cover. (See 3.1.1.3.)
3) Remove the top cover. (See 3.1.1.4.)
4) Disconnect the connector ① and remove the screw ②.
5) While lifting the jog tray top cover ③, disconnect the connector ④ and remove the jog tray top cover ③.



3.1.1.6 Removing Top Right Cover Unit

1) Remove the front cover. (See 3.1.1.2.)
2) Remove the rear cover. (See 3.1.1.3.)
3) Remove the two screws in the front ① and the two screws in the rear ②. Remove the top right cover unit ③.

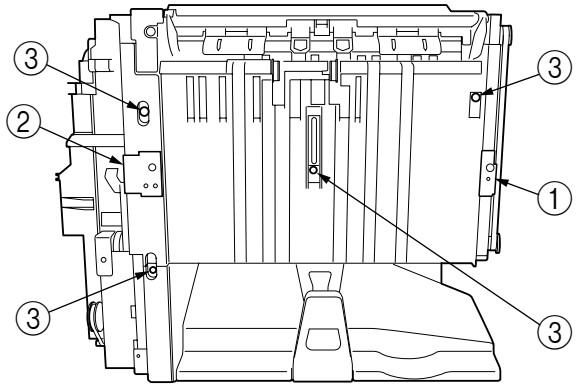


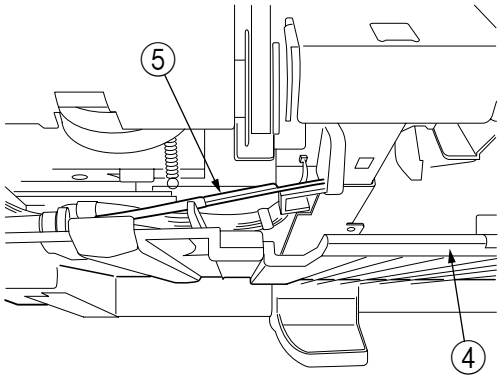
3.1.1.7 Removing Side Guide

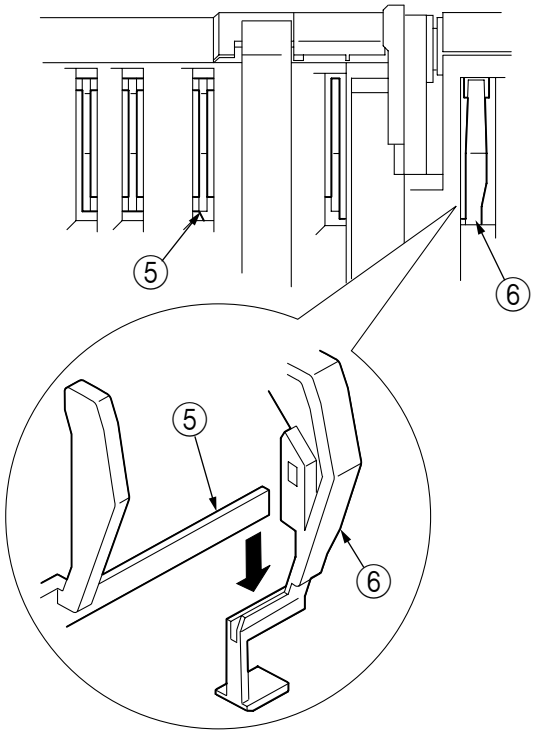
1) Remove the output tray. (See 3.1.1.1.)
2) Remove the front cover. (See 3.1.1.2.)
3) Remove the rear cover. (See 3.1.1.3.)
4) Push the front and rear output tray support plates ① and ② away from the rail grooves.
5) Remove the four screws ③.
6) Slightly pull down the side guide ④ to the front. Disengage the paper level detection lever (rear) ⑤ and then remove the side guide ④.

Note!

When fastening the side guide, fit the paper level detection lever (rear) ⑤ into the groove in the paper level detection lever (center) ⑥. Push each paper level detection lever several times to make sure that the levers are tightly engaged.







3.1.2 Feeding Parts

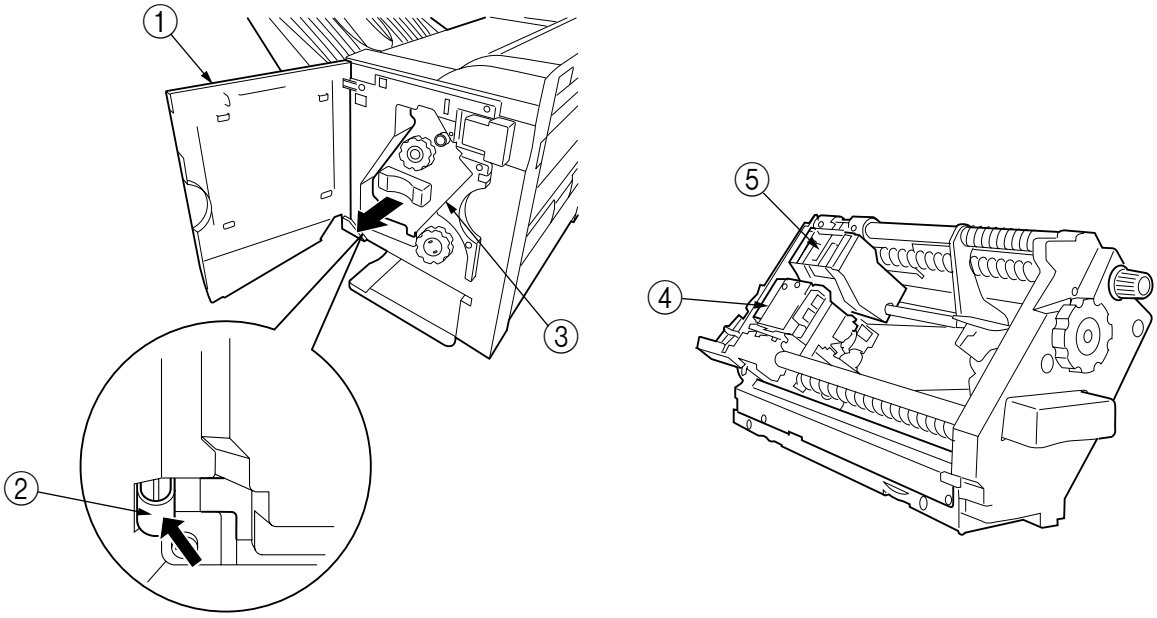
3.1.2.1 Removing Stapler Unit

1) Open the front door ①.

2) While pressing the stopper lever ②, draw out the stapler unit ③.

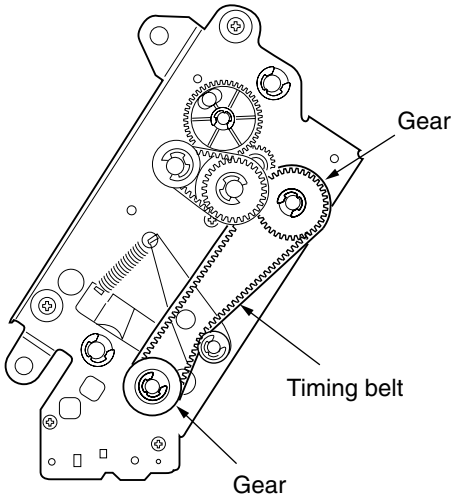
Note!

Do not remove the stapler from the shaft of the stapler frame. If the stapler is removed from the shaft, that may upset the alignment of the position in which the staple driver (the lower stapler unit) ④ thrusts out a staple with the position in which the staple clincher (the upper stapler unit) ⑤ receives the staple.

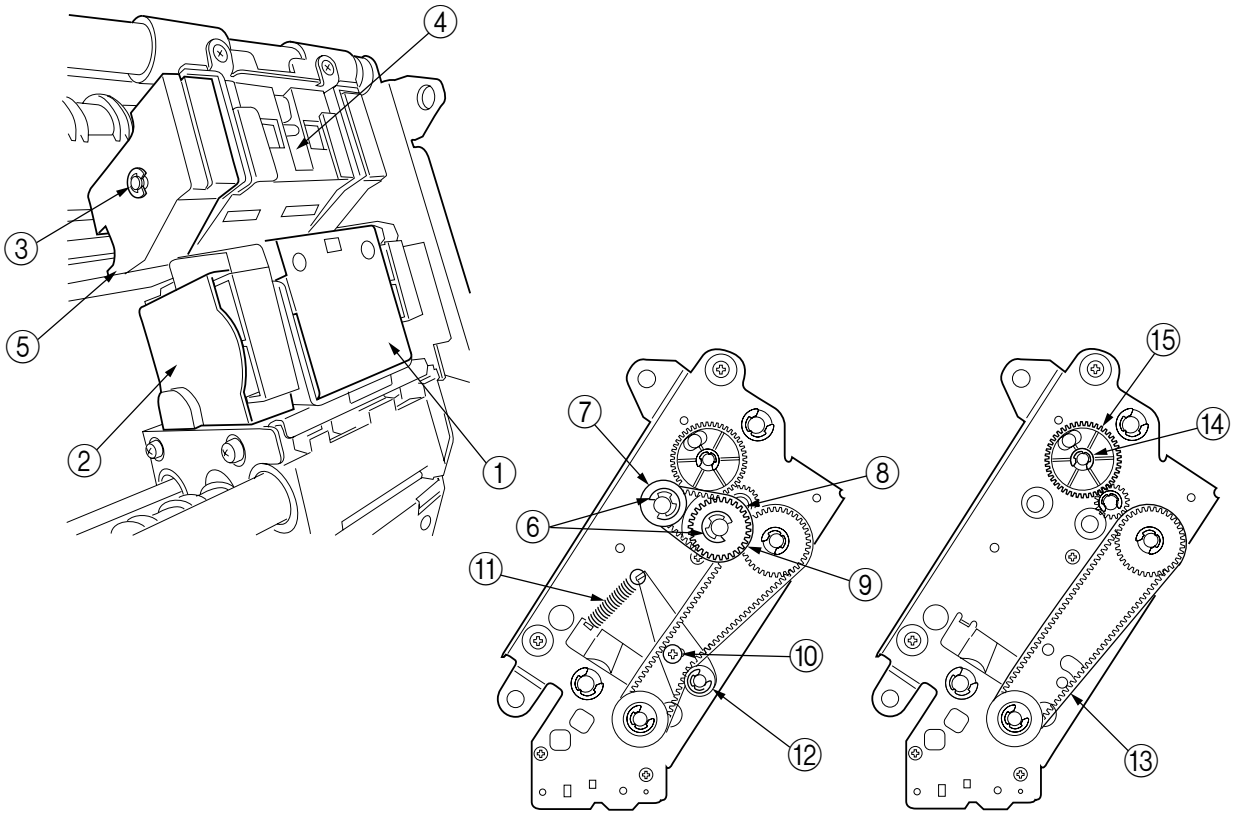


3.1.2.2 Synchronizing Stapler Motions

When you have replaced the gear at the front of the stapler or the timing belt, or when you have removed the stapler for some reason, the driving motion of the staple driver (the lower stapler unit) will go out of phase with the clinching motion of the staple clinching (the upper stapler unit). Synchronize these stapler motions in the procedure below.



1) Remove the gear cover ② of the staple driver ①.
2) Remove the E-ring ③ and remove the side cover ⑤ of the staple clincher ④.
3) Remove the two E-rings ⑥ and remove the staple jam removal gear ⑦, the timing belt ⑧ and then the intermediate gear 1 ⑨. Also, remove the spacer and spring behind the staple jam removal gear.
4) Remove the screw ⑩ and the spring ⑪ and remove the belt tensioner ⑫.
5) Remove the timing belt ⑬.
6) Remove the E-ring ⑭ and remove the staple position check gear ⑮.

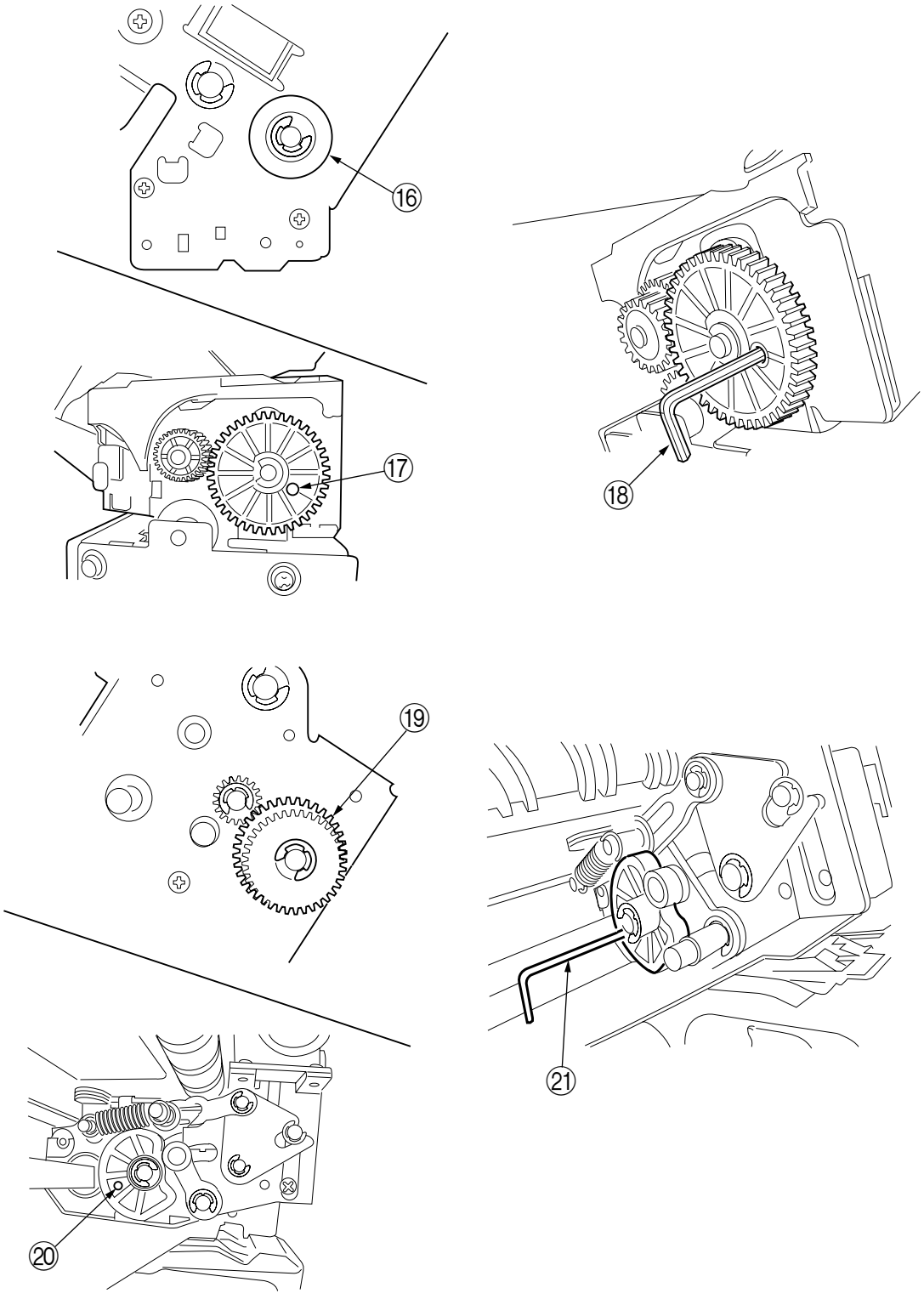


7) Turn the gear ⑯ to align the round hole ⑰ in the staple driver with the round hole behind it.

8) Insert a pin with a diameter of about 2 mm ⑱ (a 2-mm hex key wrench, for example) into the round holes to fix the gear.

9) Turn the gear ⑲ to align the round hole ⑳ in the staple clincher cam with the round hole behind it.

10) Insert a pin with a diameter of about 2 mm ㉑ (a 2-mm hex key wrench, for example) into the round holes to fix the cam.



11) With the gear and the cam fixed, put the timing belt ㉒ on the gear ㉓ and the gear ㉔.

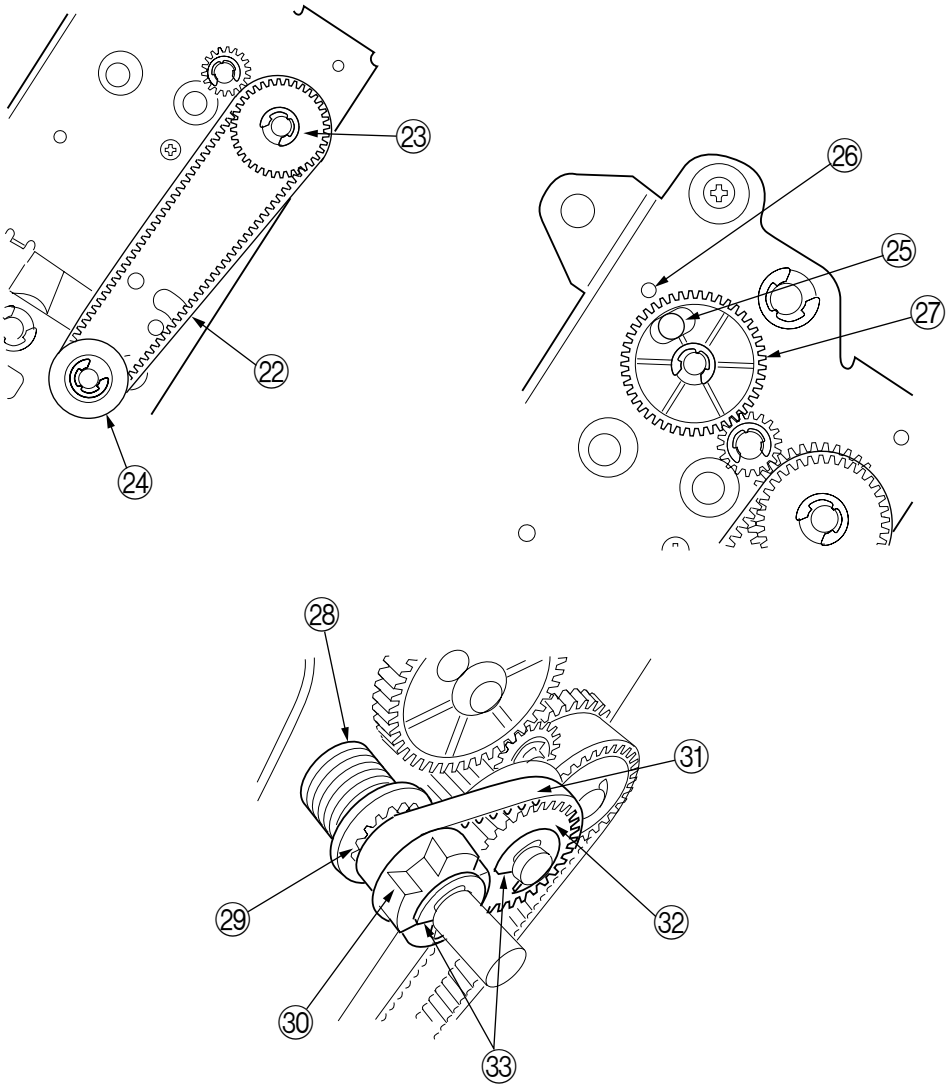
12) Fasten the staple position check gear ㉗ with its blue mark ㉕ aligned with the round hole ㉖ in the frame.

Note!

Be sure to fasten the staple position check gear in correct position. The position in which the blue mark is aligned with the round hole is the home position for the staple driving motion. If the staple jam removal dial is rotated, the stapler unit will deviate from this home position and the staple cartridge will be stuck in the unit. In that case, this blue mark is used to return the unit into home position.

13) Remove the pins fixing the gear and the cam.

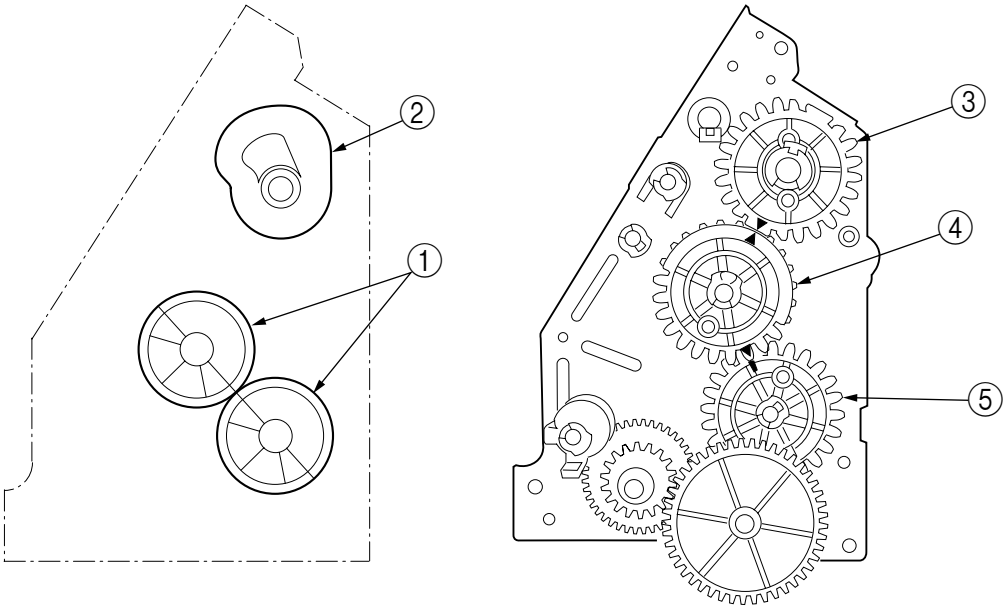
14) Put the spring ㉘, the spacer ㉙, the staple jam removal gear ㉚, the timing belt ㉛ and the intermediate gear 1 ㉜ back in place and fasten them with the E-rings ㉝.



3.1.2.3 Synchronizing Gears of Saddle-Stitcher Unit

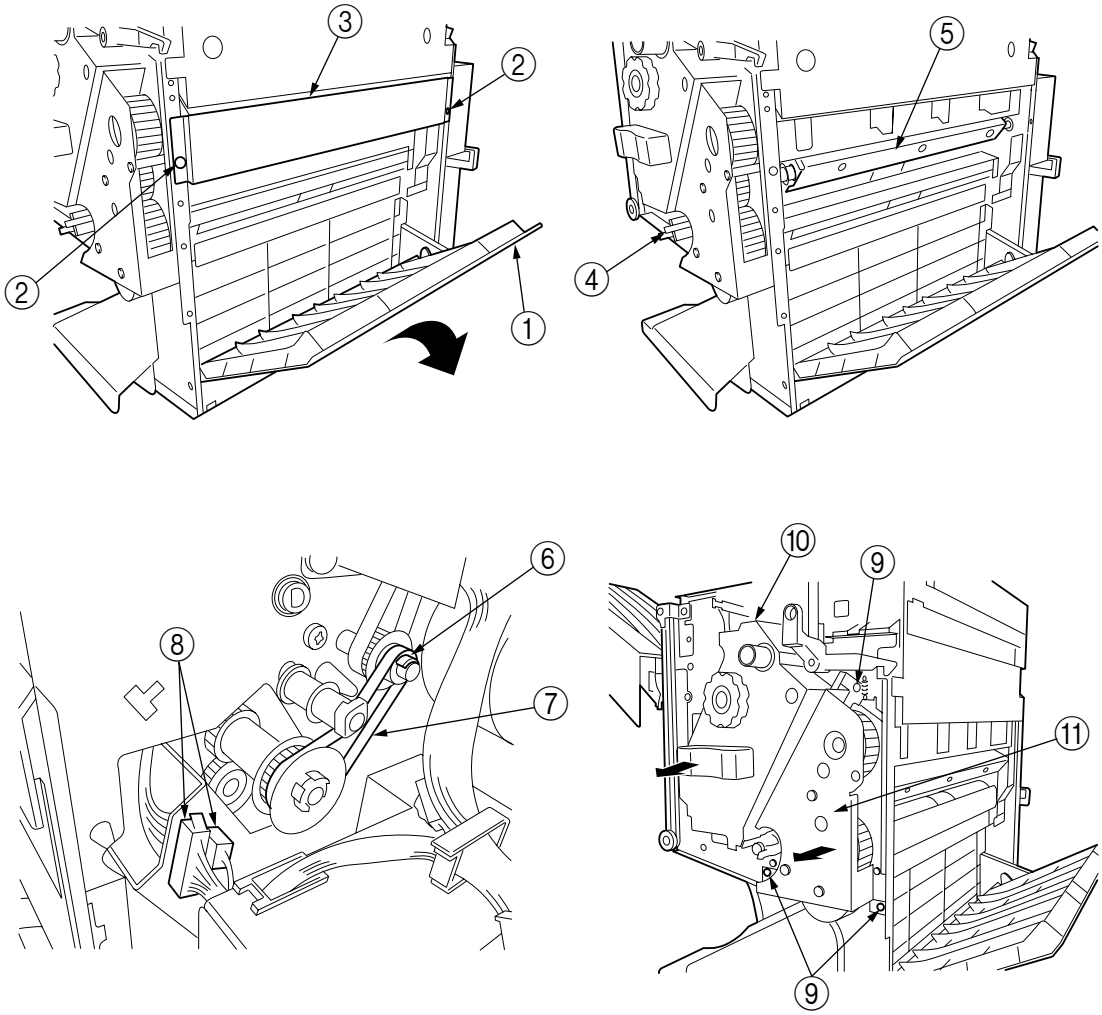
When you have replaced the gear at the front of the saddle-stitcher unit, the paper folding rollers or when you have removed these parts for some reason, synchronize the gears in the procedure below.

1) Position the paper folding rollers ① and the saddle cam ② in the saddle-stitcher unit as shown below.
2) Keeping the paper folding rollers and the saddle cam in position, fasten the gears as shown below.
   - Align the triangle mark (▲) (either of the two marks) on the saddle cam drive gear ③ with the triangle mark (▲) on the intermediate gear ④ (one on the semicircle with shorter teeth).
   - Also, align the other triangle mark (▲) on the intermediate gear ④ with a rib of the paper folding roller drive gear ⑤.



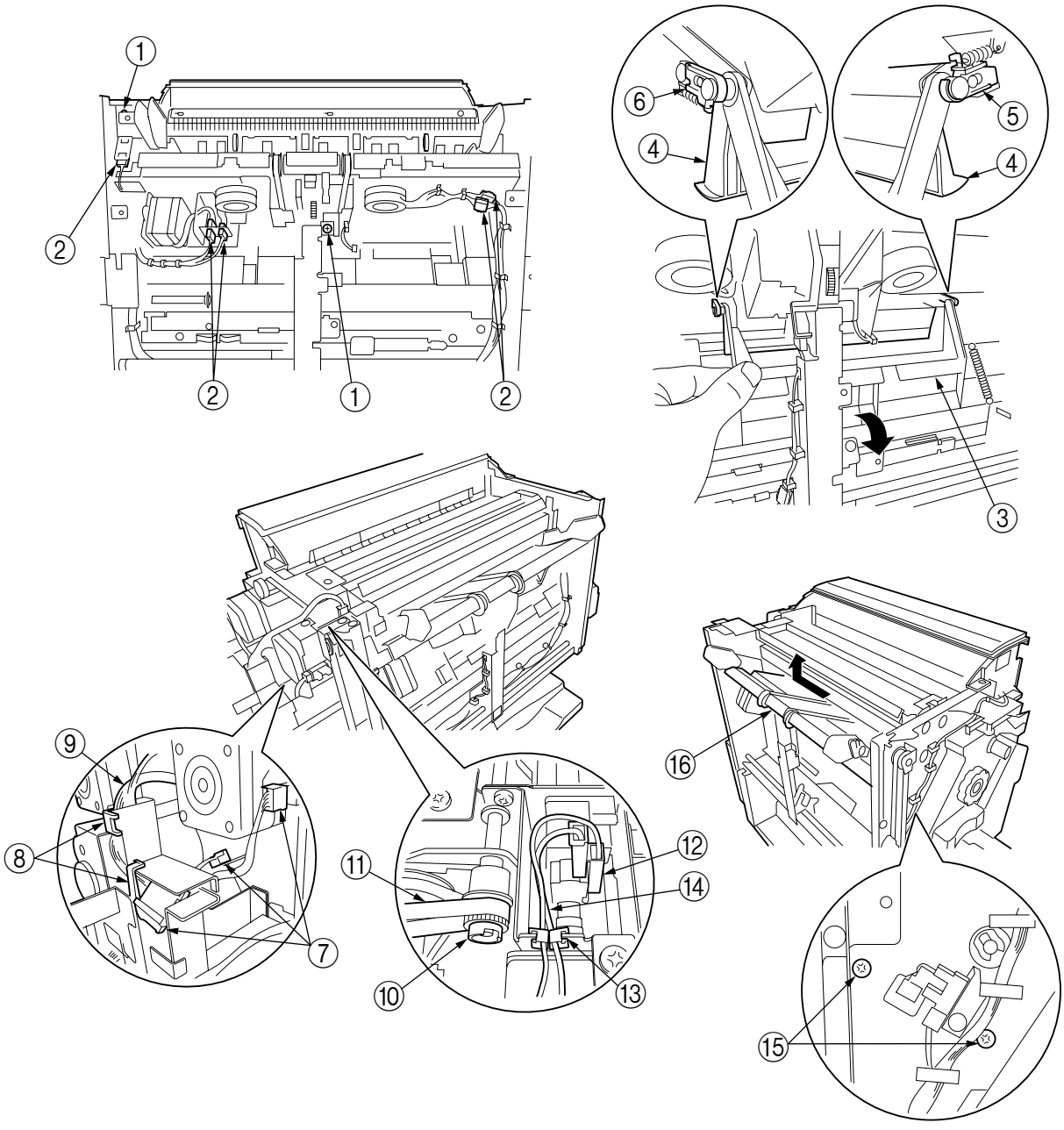
3.1.2.4 Removing Saddle-Stitcher Unit

1) Remove the front cover. (See 3.1.1.2.)
2) Remove the rear cover. (See 3.1.1.3.)
3) Open the jam removal cover ① and remove the two screws ② and the right stay ③.
4) Rotate the fold jam removal dial ④ to move the paper pressure plate ⑤ inwards.
5) Remove the stop ring ⑥ and remove the timing belt ⑦.
6) Disconnect the two connectors ⑧.
7) Remove the three screws ⑨ and slightly draw out the stapler unit ⑩.
8) Draw out the saddle-stitcher unit ⑪.



3.1.2.5 Removing Jog Tray Unit

1) Remove the jog tray top cover. (See 3.1.1.5.)
2) Remove the side guide. (See 3.1.1.7.)
3) Remove the two screws ① and disconnect the five connectors ②.
4) Pull the jog tray stopper base ③ and release the front click ⑤ and the rear click ⑥ of the jog tray stopper ④.
5) Disconnect the three connectors ⑦.
6) Release the two cable clamps ⑧ and remove the motor bundled cable ⑨.
7) Remove the stop ring ⑩ and remove the timing belt ⑪.
8) Disconnect the connector ⑫ and remove the bundled cable ⑭ from the edge saddle ⑬.
9) Remove the two screws ⑮. Slide the jog tray unit ⑯ towards the rear and then lift it up to remove the unit.



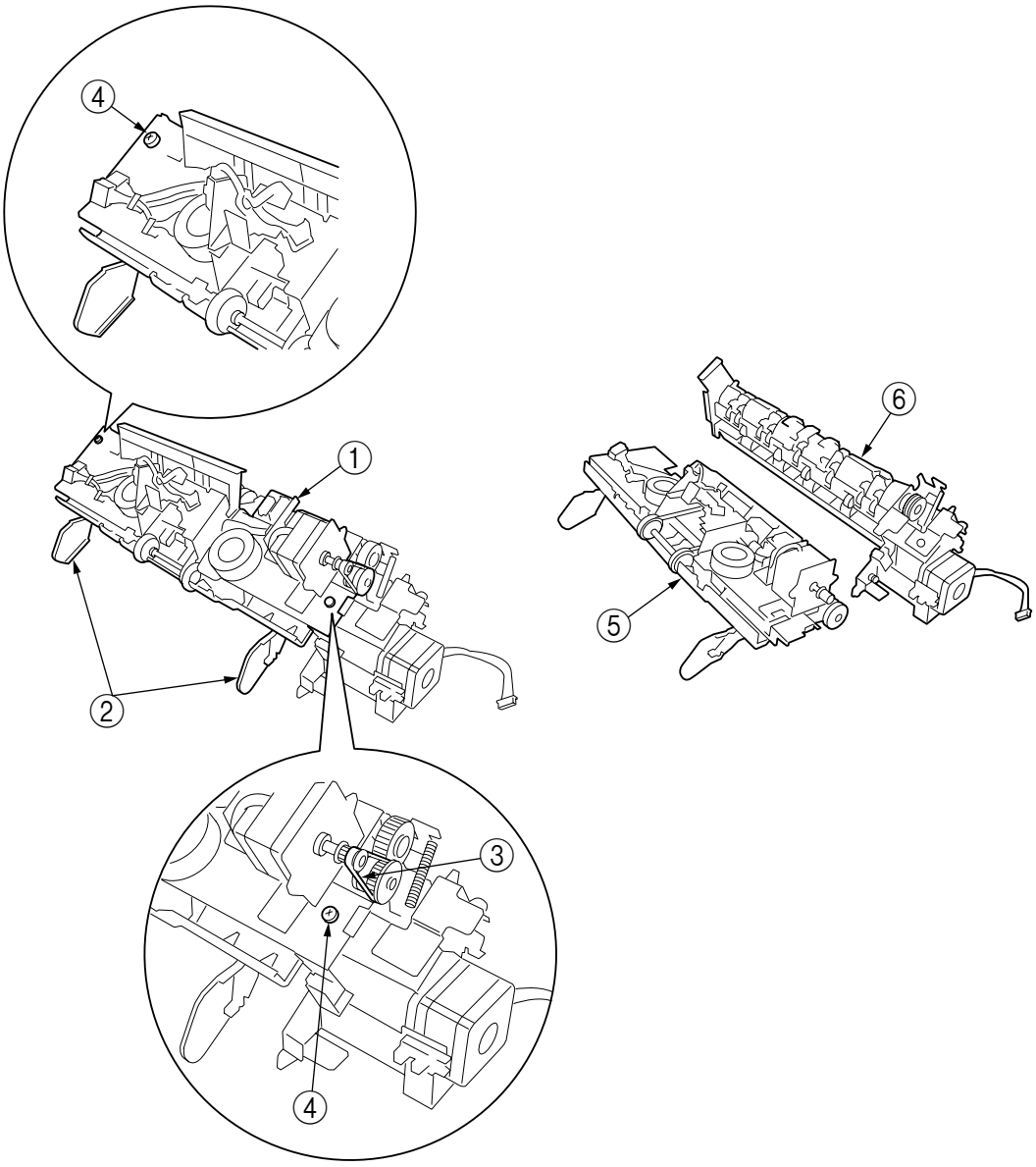
3.1.2.6 Removing Paddle Unit

1) Remove the jog tray unit. (See 3.1.2.5.)
2) Place the jog tray unit ① as shown below.

Note!

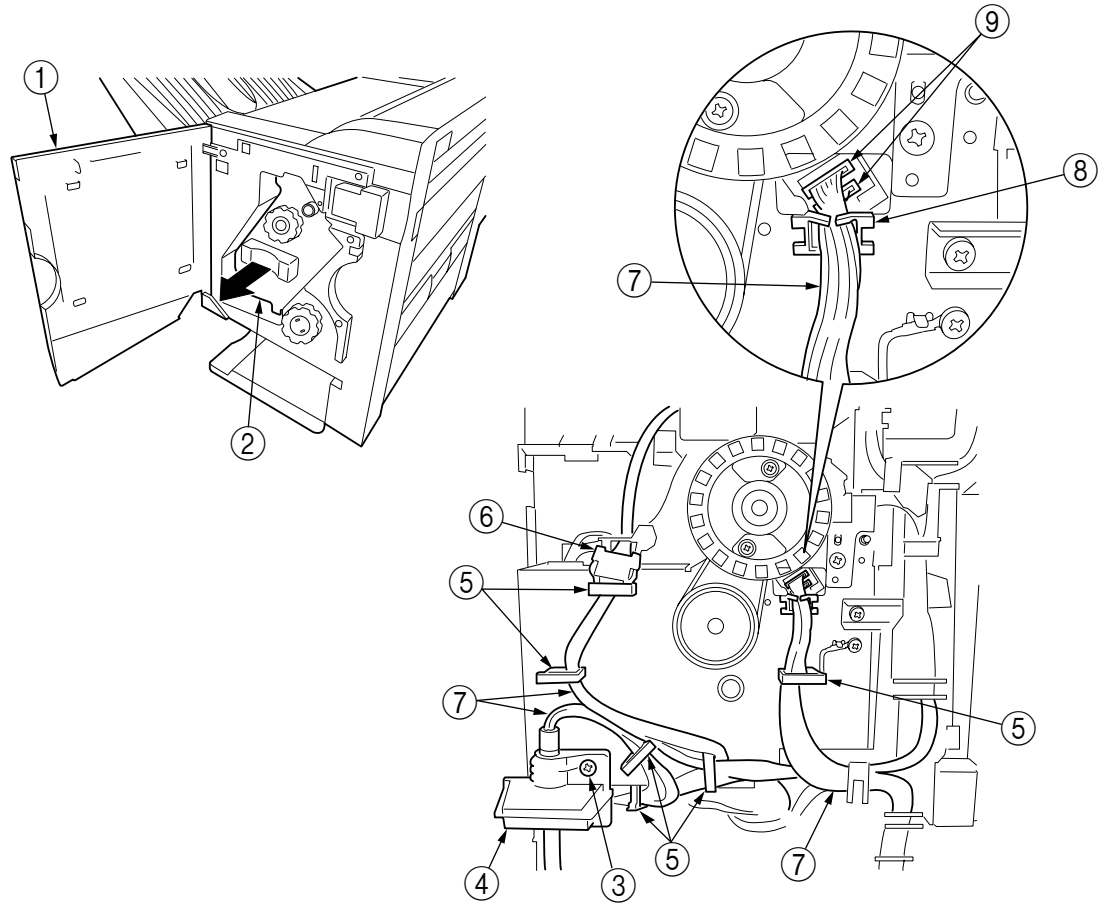
Be careful not to damage the jog plates ②.

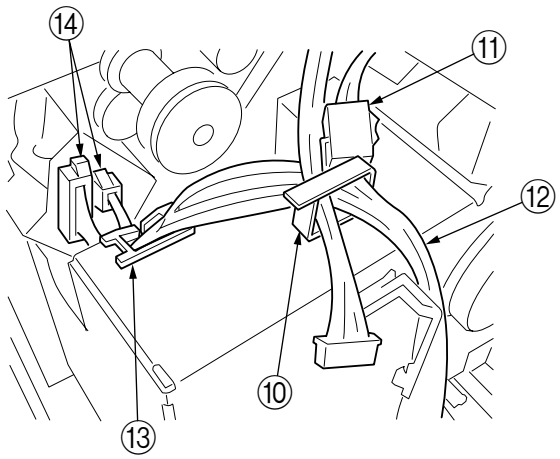
3) Remove the timing belt ③ and remove the two screws ④.
4) Separate the paddle unit ⑥ from the jog tray unit ⑤.



3.1.2.7 Removing Staple/Fold Drive Unit

1) Open the front door ① and slightly draw out the stapler unit ②.
2) Remove the screw ③ and remove the interface cable bracket ④.
3) Release the six cable clamps ⑤ and disconnect the connector ⑥.
4) Release the bundled cable ⑦ from the cable clamp ⑤.
5) Release the bundled cable ⑦ from the edge saddle ⑧ and disconnect the two connectors ⑨.
6) Release the cable clamp ⑩ and disconnect the connector ⑪.
7) Release the bundled cable ⑫ from the cable clamp ⑩.
8) Release the bundled cable ⑫ from the edge saddle ⑬ and disconnect the two connectors ⑭.



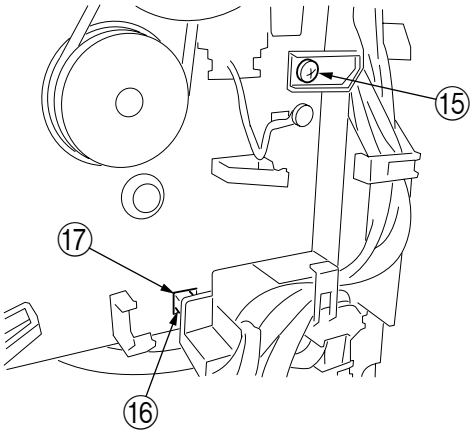


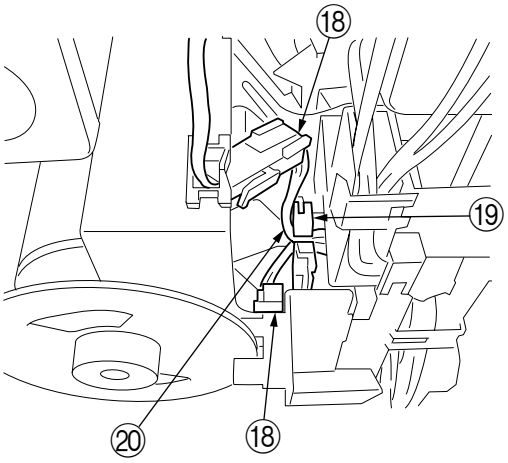
9) Remove the screw ⑮ and release the cable guide click ⑰ from the square hole ⑯ of the base plate.

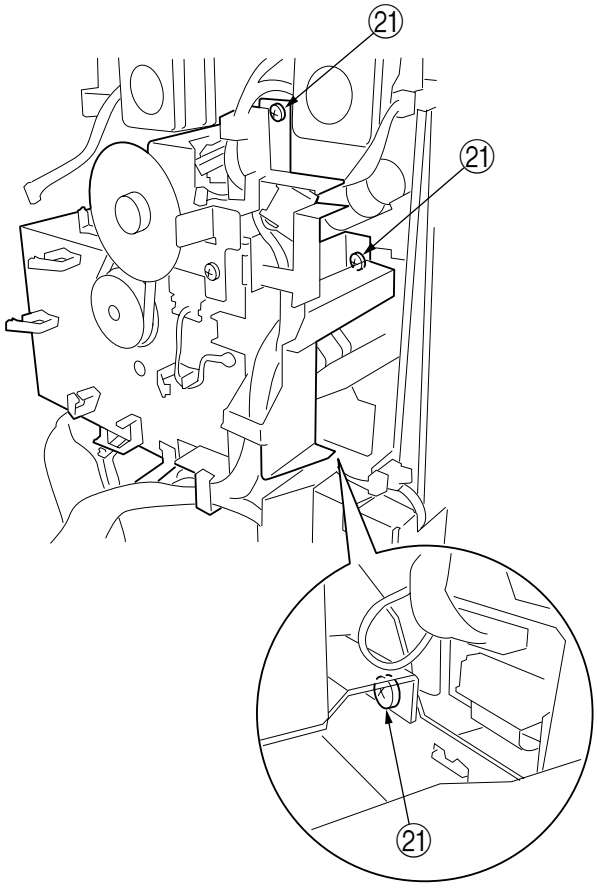
10) Disconnect the two connectors ⑱ and release the bundled cable ⑳ from the edge saddle ⑲.

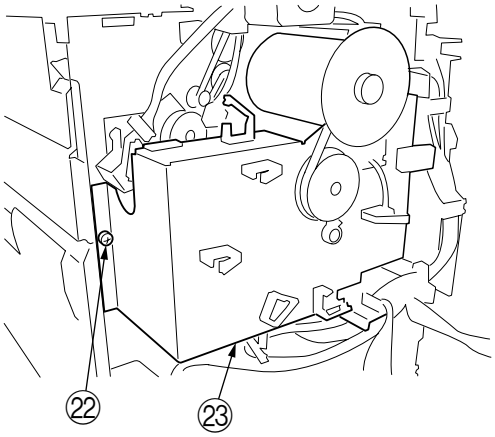
11) Remove the three screws ㉑.

12) Remove the screw ㉒ and remove the staple/fold drive unit ㉓.



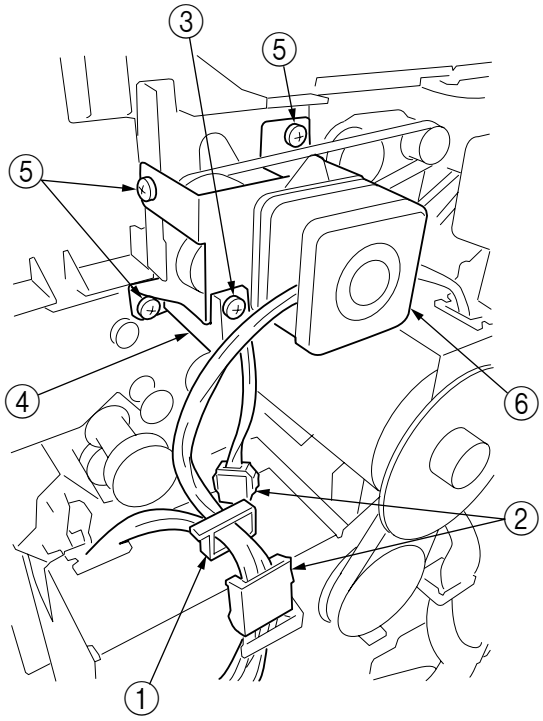






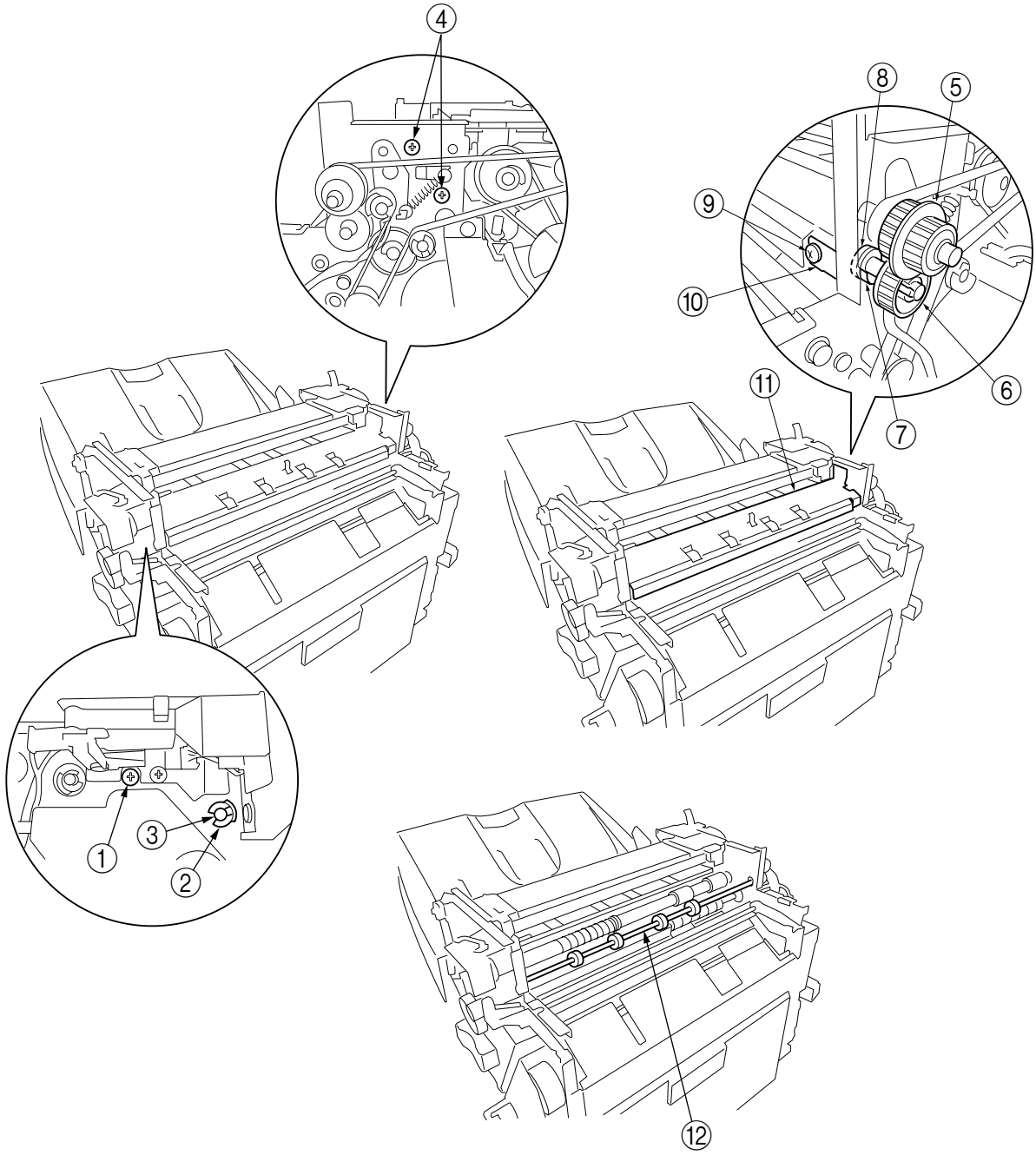
3.1.2.8 Removing Feed Motor Unit

1) Remove the rear cover. (See 3.1.1.3.)
2) Open the cable clamp ① and disconnect the two connectors ②.
3) Remove the screw ③ and remove the cable guide ④.
4) Remove the three screws ⑤ and remove the feed motor unit ⑥.



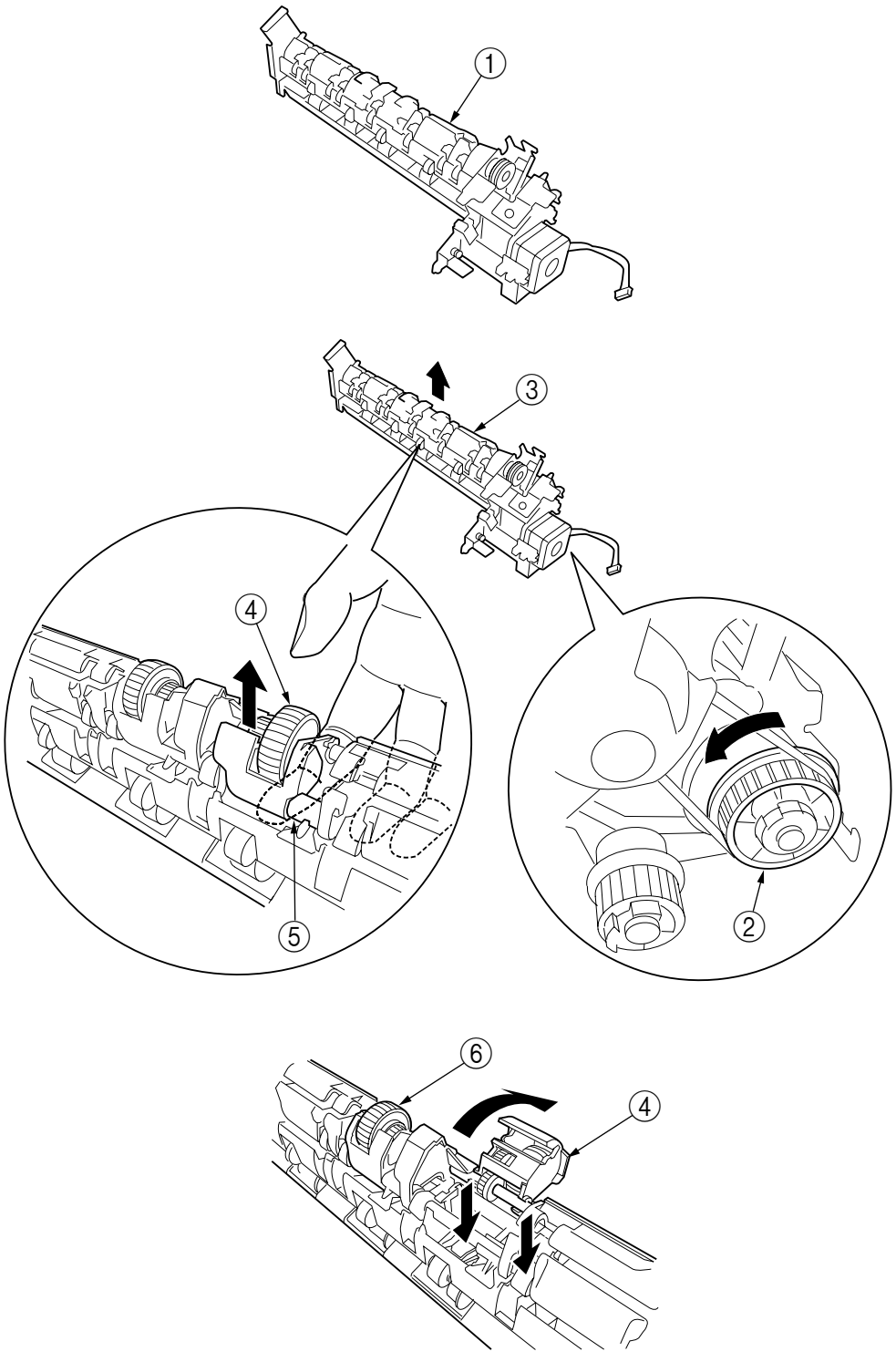
3.1.2.9 Removing Feed Roller

1) Remove the top cover. (See 3.1.1.4.)
2) Remove the top right cover unit. (See 3.1.1.6.)
3) Remove the feed motor unit. (See 3.1.2.6.)
4) Remove the screw ①.
5) Remove the stop ring ② and remove the bearing ③.
6) Remove the two screws ④.
7) Remove the gear ⑤. While opening the claw, remove the gear ⑥.
8) Remove the stop ring ⑦ and remove the bearing ⑧.
9) Remove the screw ⑨ and remove the inlet sensor ⑩.
10) Remove the paper guide ⑪.
11) Remove the feed rollers ⑫.



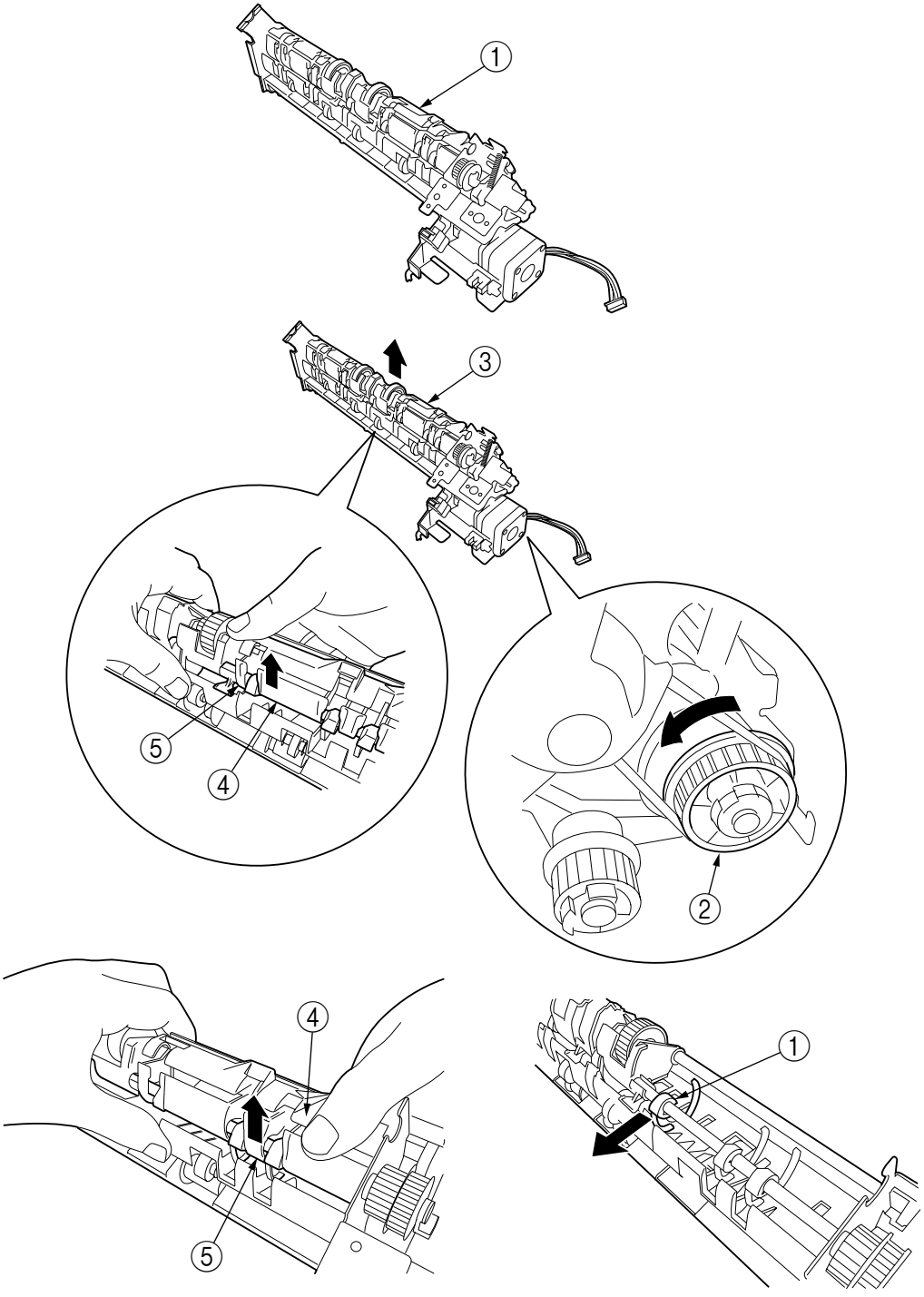
3.1.2.10 Removing Multi-Sheet Delivery Roller (Top)

1) Remove the paddle unit. (See 3.1.2.6.)
2) Place the paddle unit ① as shown below.
3) Turn the gear ② in the arrow direction to raise the multi-sheet delivery roller (top) ③.
4) Push up the multi-sheet delivery roller (top) ④ and release the multi-sheet delivery roller (top) ④ from the shaft ⑤.
5) Swing open the multi-sheet delivery roller (top) ④, push it down and remove it.
6) Remove the multi-sheet delivery roller (top) at the front ⑥ in the same way.



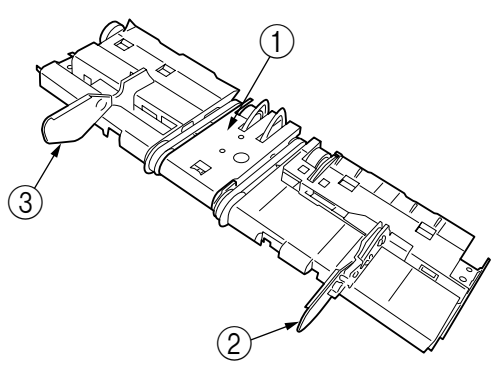
3.1.2.11 Removing Paddle

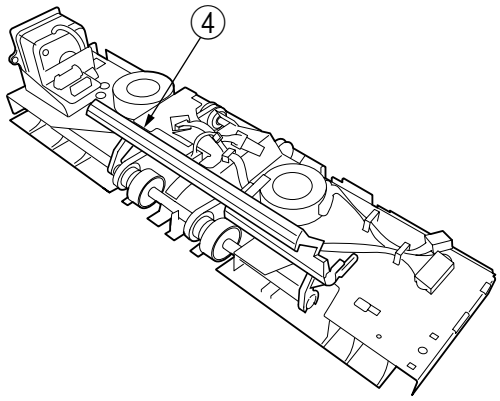
1) Remove the paddle unit. (See 3.1.2.6.)
2) Place the paddle unit ① as shown below.
3) Turn the gear ② in the arrow direction to raise the multi-sheet delivery roller (top) ③.
4) Push up the safety guide ④ and release one side of the safety guide ④ from the shaft ⑤.
5) Push up the safety guide ④, release the safety guide ④ from the shaft ⑤ and remove the guide.
6) Move the paddle ⑥ in the arrow direction and remove it.
7) Remove the remaining paddles in the same way.



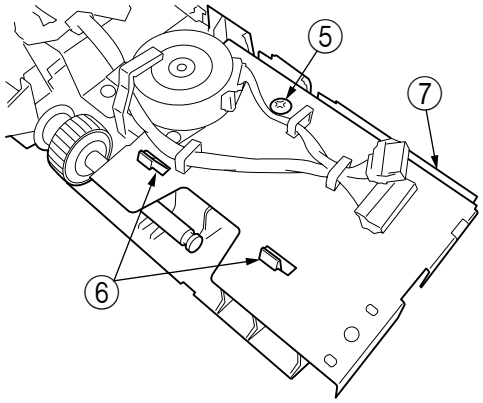
3.1.2.12 Removing Multi-Sheet Delivery Roller (Bottom)/Delivery Belt

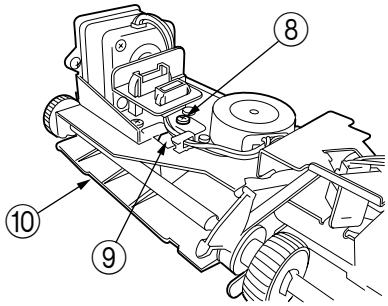
1) Remove the paddle unit and separate the jog tray unit from it. (See 3.1.2.6.)
2) Slide the jog plate (front) ② and the jog plate (rear) ③ of the jog tray unit ① outwards and remove them.
3) Remove the jog tray stopper ④.



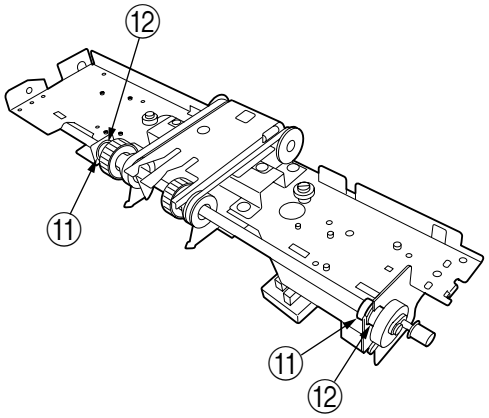


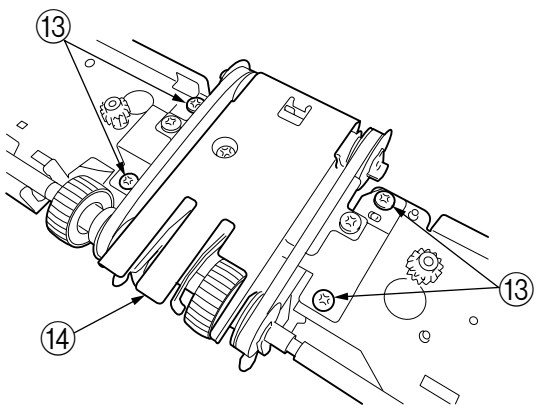
4) Remove the screw ⑤. While releasing the two clicks ⑯, remove the paper guide (front) ⑦.
5) Remove the screw ⑧. While releasing the click ⑨, remove the paper guide (rear) ⑩.



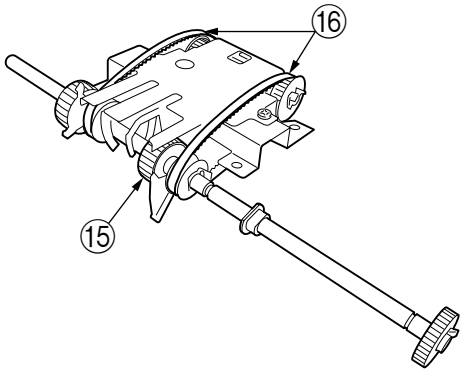


6) Remove the two stop rings ⑪ and move the two bearings ⑫ inwards.
7) Remove the four screws ⑬, lift up the multi-sheet delivery roller (bottom) ⑭ and remove it.



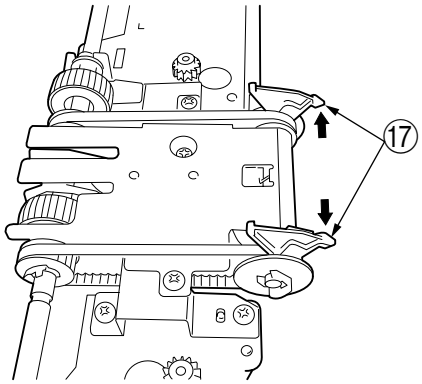


8) Remove the multi-sheet delivery roller (bottom) ⑮ and the two delivery belts ⑯.



Note!

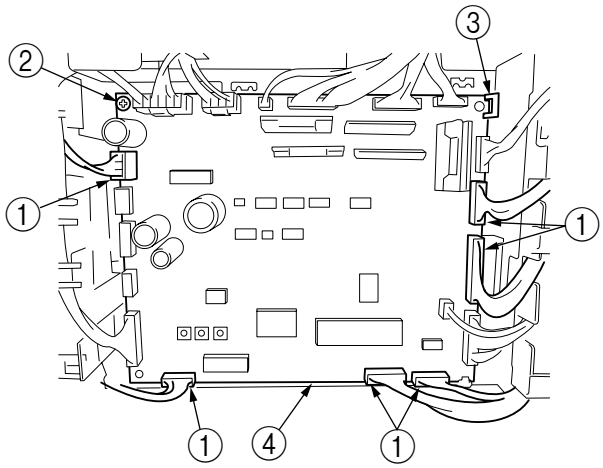
When the delivery belts have been put back on, make sure that the tips ⑰ of the clicks of the delivery belts are aligned.



3.1.3 Circuit Boards

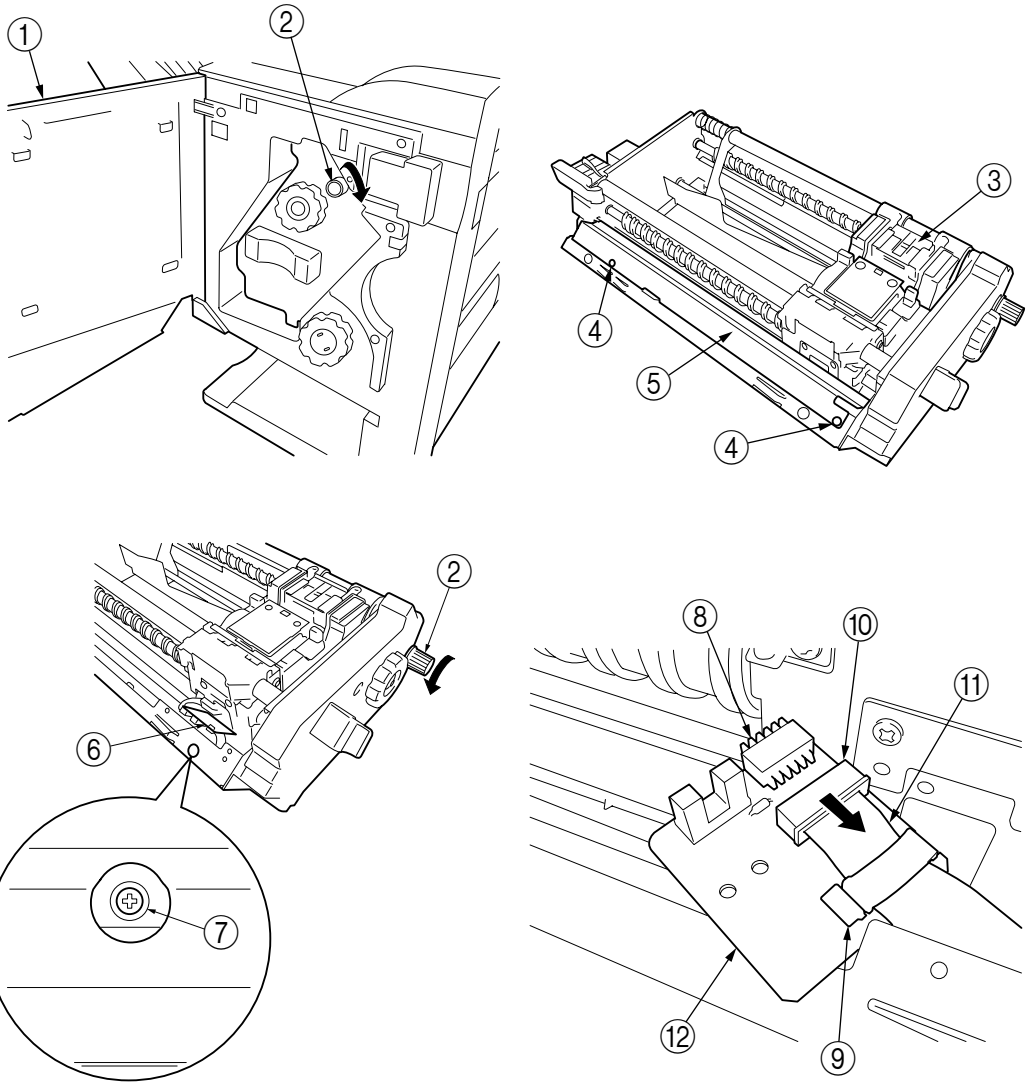
3.1.3.1 Removing Finisher Controller Circuit Board

1) Remove the rear cover. (See 3.1.1.3.)
2) Disconnect the 17 connectors ① and remove the screw ②.
3) Release the circuit board clip ③ and remove the finisher controller circuit board ④.



3.1.3.2 Removing Slide Home Position Circuit Board

1) Open the front door ①. Turn the stapler slide knob ② in the arrow direction to slide the stapler to its forwardmost position.
2) Remove the stapler unit. (See 3.1.2.1.)
3) Place the stapler unit ③ as shown below.
4) Remove the two screws ④ and remove the guide ⑤.
5) Turn the stapler slide knob ② in the arrow direction until the locking screw ⑦ of the slide home position circuit board ⑥ is seen through the round hole.
6) Remove the locking screw ⑦.
7) Disconnect the connector ⑧.
8) Remove the flexible cable clamp ⑨.
9) Move the connector lock ⑩ in the arrow direction to release it. Remove the flexible cable ⑪ and remove the slide home position circuit board ⑫.

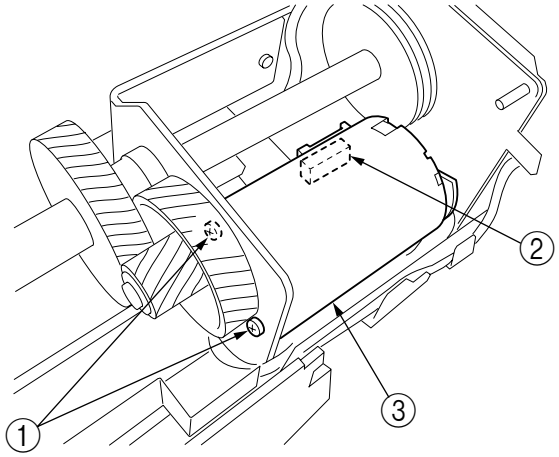


3.2 Puncher Unit (Optional)

3.2.1 Puncher Driving Parts

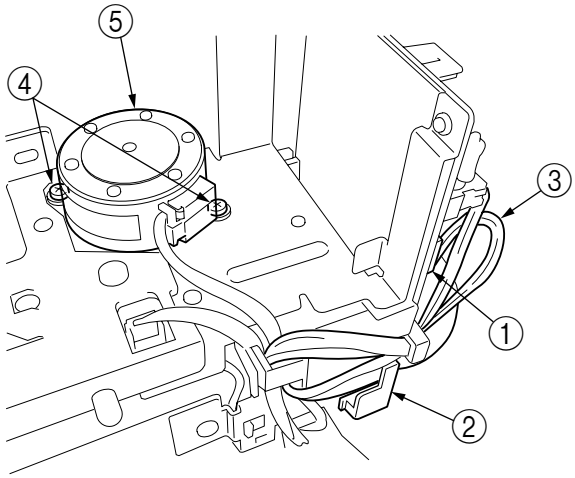
3.2.1.1 Removing Punch Motor

1) Remove the two screws ①.
2) Disconnect the connector ② and remove the punch motor ③.



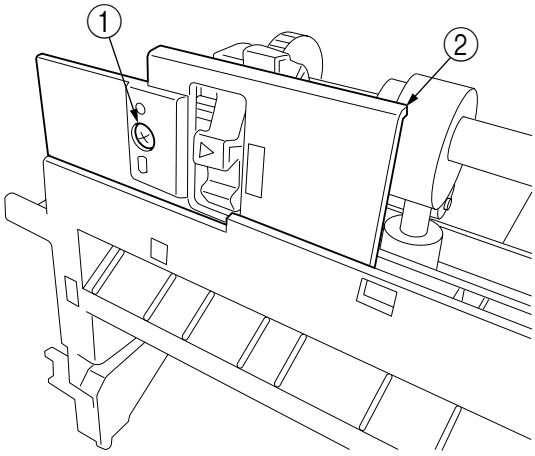
3.2.1.2 Removing Side Registration Motor

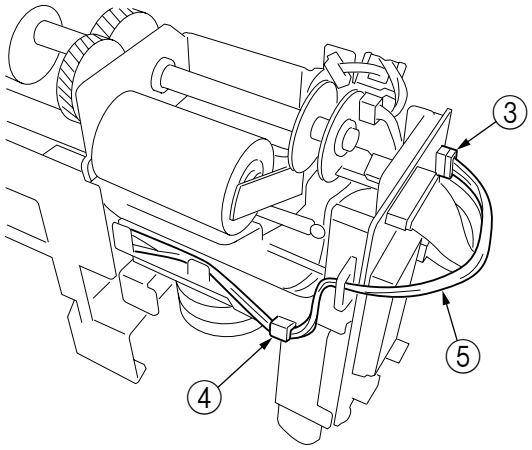
1) Disconnect the connector J1001 ①.
2) Release the bundled cable ③ from the cable guide ②.
3) Remove the two screws ④ and remove the side registration motor ⑤.



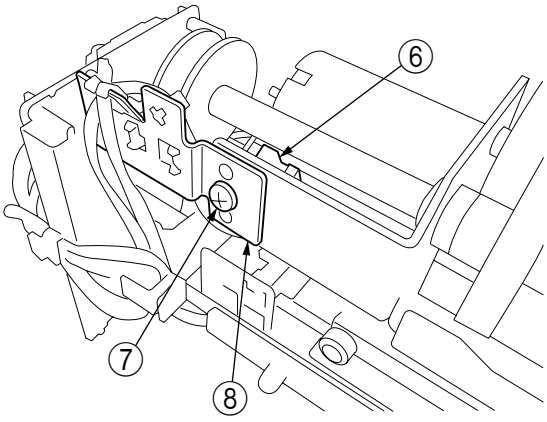
3.2.1.3 Removing Puncher Unit

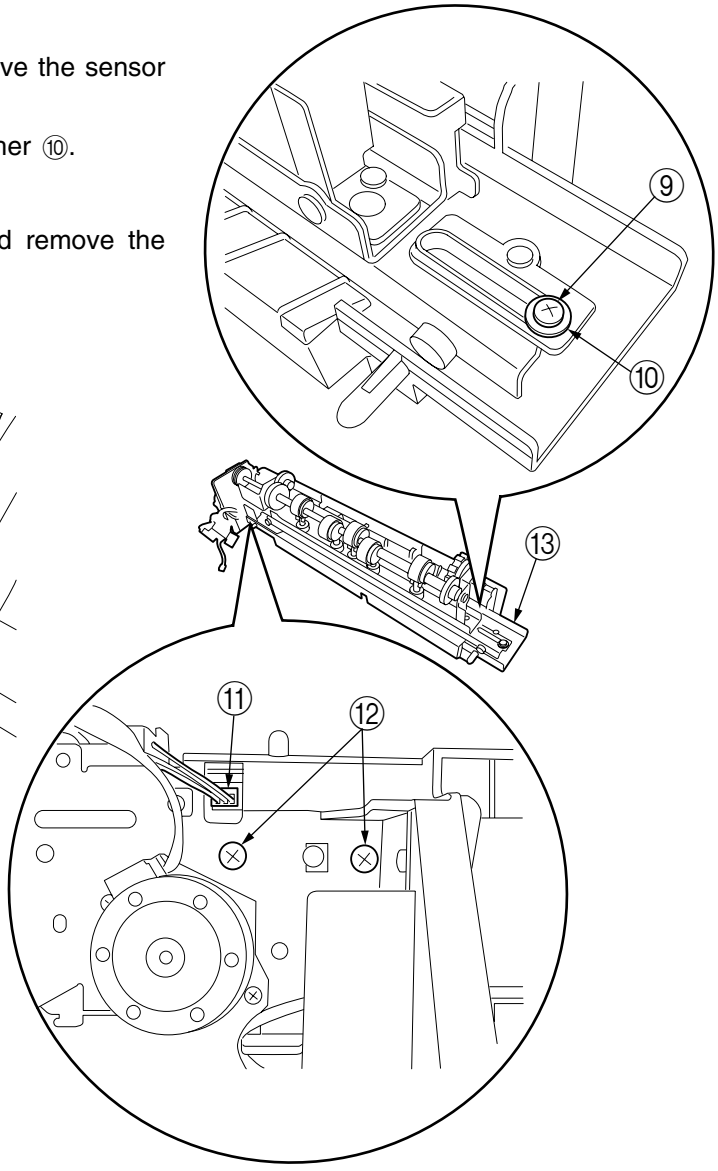
1) Remove the punch dust receptacle.
2) Remove the screw ① and remove the jam removal cover ②.
3) Disconnect the connector J1005 ③.
4) Release the bundled cable ⑤ from the cable guide ④.





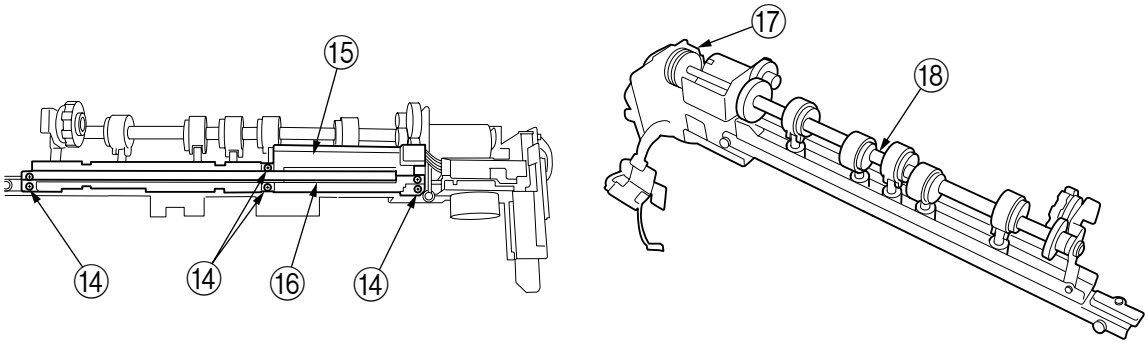
5) Disconnect the connector ⑥.
6) Remove the screw ⑦ and remove the sensor support plate ⑧.
7) Remove the screw ⑨ and washer ⑩.
8) Disconnect the connector ⑪.
9) Remove the two screws ⑫ and remove the base cover ⑬.





10) Remove the four screws ⑭ and remove the transmissive sensor unit units (top)⑮ and (bottom) ⑯.

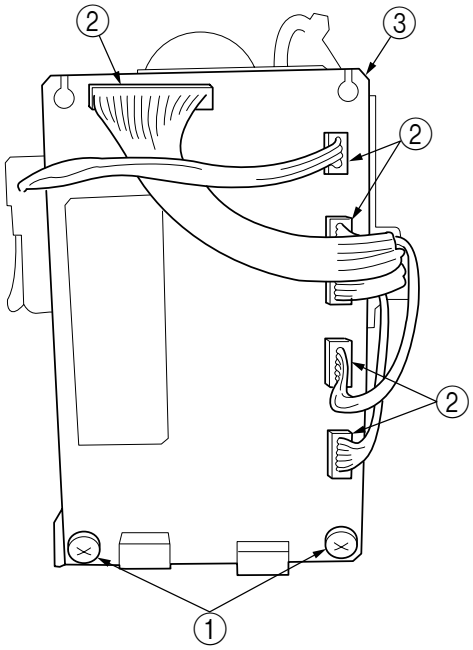
11) Remove the puncher unit ⑱ from the side registration motor unit ⑰.



3.2.2 Circuit Boards

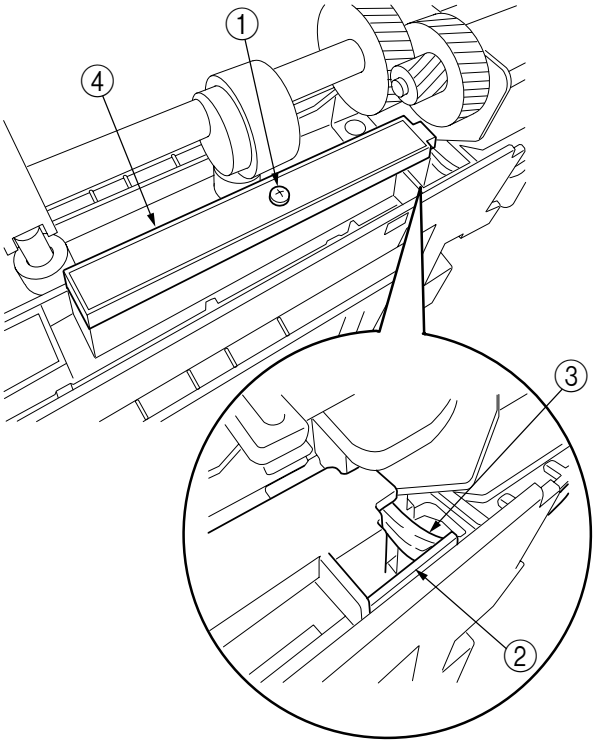
3.2.2.1 Removing Punch Controller Circuit Board

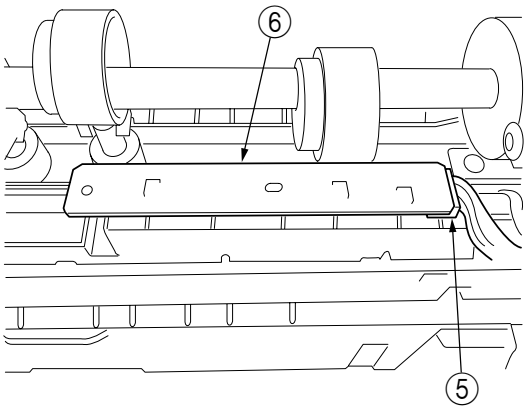
1) Remove the two screws ①.
2) Disconnect the five connectors ② and remove the punch controller circuit board ③.



3.2.2.2 Removing Photo Sensor Circuit Board

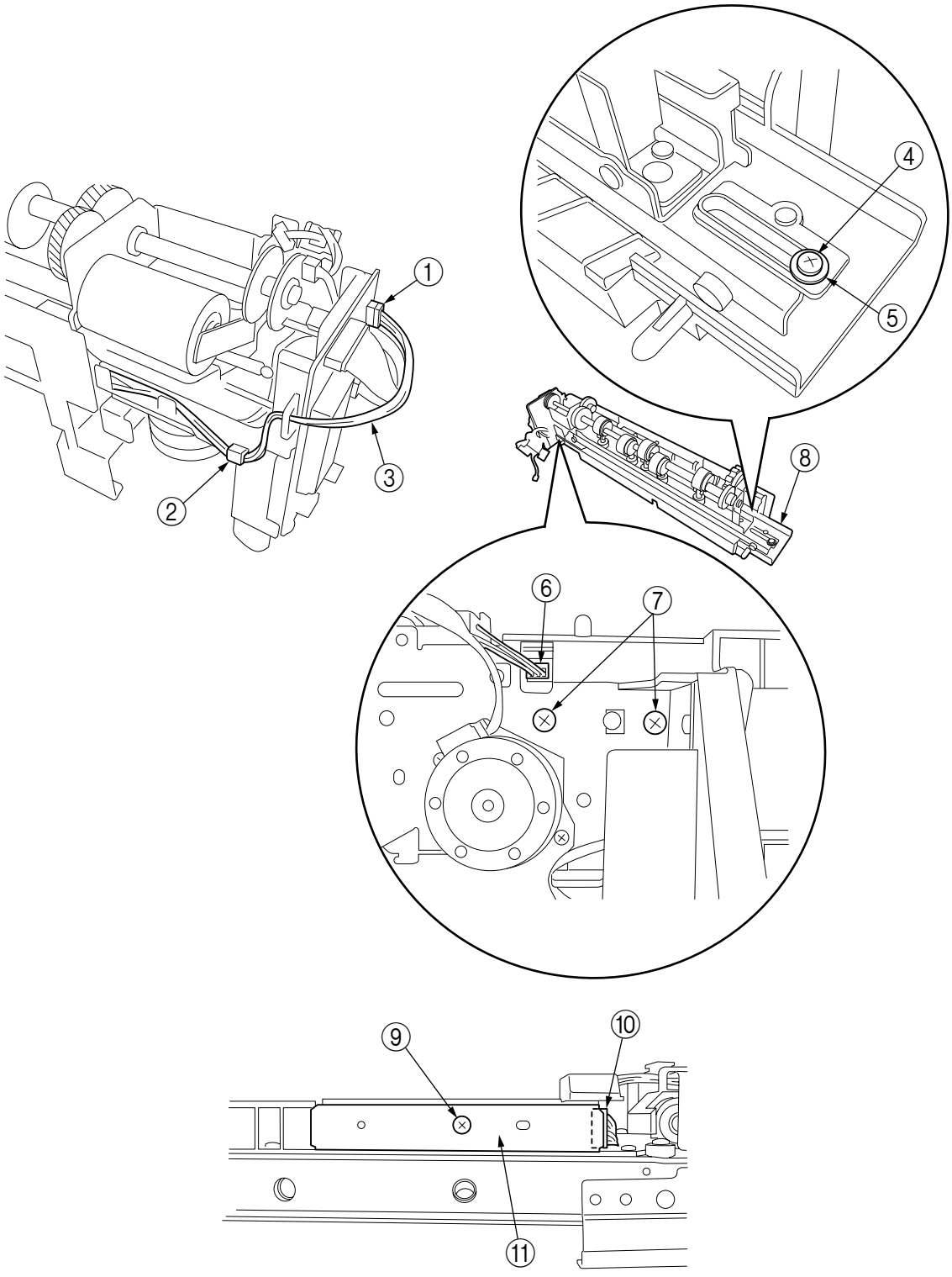
1) Remove the punch motor. (See 3.2.1.1.)
2) Remove the screw ①.
3) Release the bundled cable ③ from the cable guide ② of the circuit board cover and remove the circuit board cover ④.
4) Disconnect the connector ⑤ and remove the photo sensor circuit board ⑥.





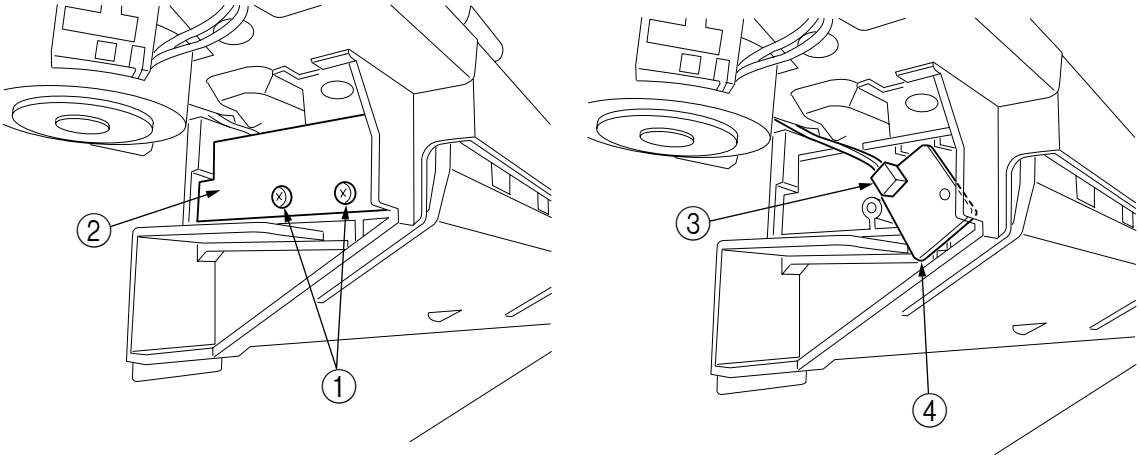
3.2.2.3 Removing LED Circuit Board

1) Remove the punch dust receptacle.
2) Disconnect the connector J1005 ①.
3) Release the bundled cable ③ from the cable guide ②.
4) Remove the screw ④ and washer ⑤.
5) Disconnect the connector ⑥.
6) Remove the screw ⑦ and remove the base cover ⑧.
7) Remove the screw ⑨.
8) Disconnect the connector ⑩ and remove the LED circuit board ⑪.



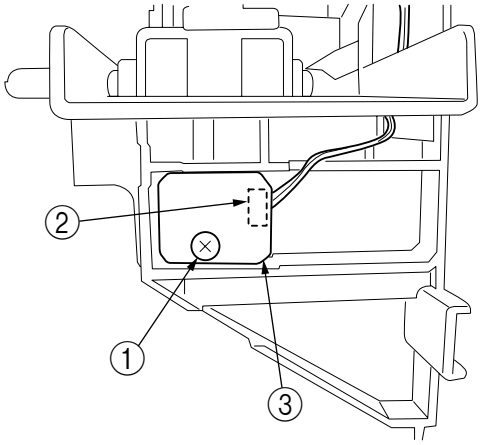
3.2.2.4 Removing Dust Full Photo Sensor Circuit Board

1) Remove the punch controller circuit board. (See 3.2.2.1.)
2) Remove the two screws ① and remove the circuit board film ②.
3) Disconnect the connector ③ and remove the dust full photo sensor circuit board ④.



3.2.2.5 Removing Dust Full LED Circuit Board

1) Remove the screw ①.
2) Disconnect the connector ② and remove the LED circuit board ③.



4. MAINTENANCE AND INSPECTION

4.1 Periodical Replacement Parts

4.1.1 Finisher/Saddle-Stitcher Unit

These units use no parts requiring periodical replacement.

4.1.2 Puncher Unit (Optional)

This unit uses no parts requiring periodical replacement.

4.2 Expendable Parts Durability Guide

The parts listed in the table below can be deteriorated or broken, requiring replacement, at least once during the warranty period of the product. These parts, however, need to be replaced only when problem has occurred.

4.2.1 Finisher/Saddle-Stitcher Unit

Table 4-01

No.	Parts Name	Parts No.	Quantity	Durability	Remarks
1	Stapler	43223350	1	300,000 operations	About 5000 stapling operations with one cartridge

4.3 Periodical Maintenance

Table 4-02

Item	Interval	Detail	Remarks
Paper feeder roller	Printer minimum maintenance interval	Cleaning	Wipe with a damp cloth.
Paper feeder roller	Printer minimum maintenance interval	Cleaning	Wipe with a damp cloth.
Feed path/guide	Printer minimum maintenance interval	Cleaning	Wipe with a damp cloth.
Transmissive sensor (optional puncher unit)	Printer minimum maintenance interval	Cleaning	Wipe with a dry cloth.

5. TROUBLESHOOTING

5.1 Standards and Adjustment

(Can be adjusted using a command from the main unit)

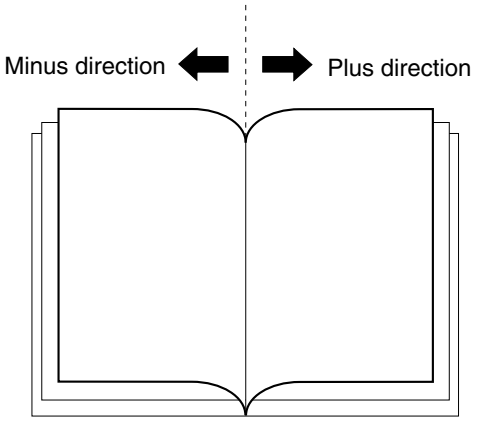
5.1.1 Electrical System, Finisher/Saddle-Stitcher Unit

5.1.1.1 Adjusting Fold Position

To adjust the fold position, bring the fold position into the stapling position. Make this adjustment, when the finisher controller circuit board has been replaced or when the fold position has to be changed for some reason.

1) Set the SW1 on the finisher controller circuit board as shown below.

2) Press the PSW1 or PSW2 on the finisher controller circuit board for the appropriate number of times to adjust the fold position. When the switch is pressed once, the fold position is moved about 0.16 mm.
   - Press the PSW1 to move the fold position in the “minus direction.”
   - Press the PSW2 to move the fold position in the “plus direction.”
   - Press the PSW1 and PSW2 simultaneously to clear the set correction.

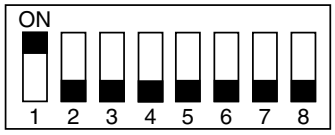


3) After a correction for the fold position has been set, turn off all the bits of the SW1 on the finisher controller circuit board.
4) Perform the booklet mode of the connected machine to see if the fold position is adjusted properly. If not, make adjustment again.

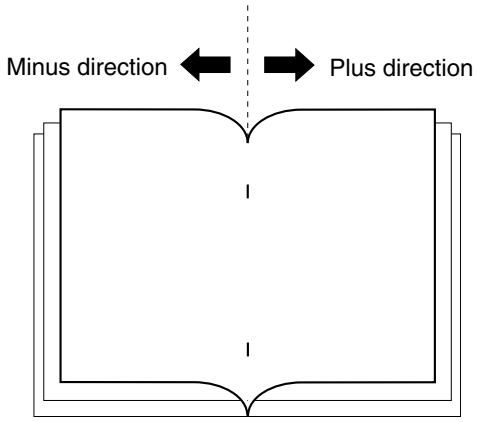
5.1.1.2 Adjusting Saddle-Stitch Double Stapling Position

To adjust the stapling position, bring the stapling position into the fold position. Make this adjustment, when the finisher controller circuit board has been replaced or when the stapling position has to be changed for some reason.

1) Set the SW1 on the finisher controller circuit board as shown below.



2) Press the PSW1 or PSW2 on the finisher controller circuit board for the appropriate number of times to adjust the fold position. When the switch is pressed once, the stapling position is moved about 0.14 mm.
   - Press the PSW1 to move the stapling position in the “minus direction.”
   - Press the PSW2 to move the stapling position in the “plus direction.”
   - Press the PSW1 and PSW2 simultaneously to clear the set correction.



3) After a correction for the stapling position has been set, turn off all the bits of the SW1 on the finisher controller circuit board.
4) Perform the booklet mode of the connected machine to see if the stapling position is adjusted properly. If not, make adjustment again.

5.1.2 Electrical System, Puncher Unit (Optional)

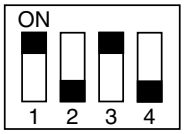
5.1.2.1 Adjusting Punch Hole Position (Feeding Direction)

This adjustment is available in the service mode only. The correction is set within the range from -3 to 3 and the hole position is moved in an increment of 1 mm. If the correction setting is increased, the hole position moves towards the leading end of paper. (See the service manual for the connected machine.)

5.1.2.2 Adjusting Sensor Output

Make this adjustment, when the punch controller circuit board, the side registration sensor (photo sensor circuit board/LED circuit board), or the dust full sensor (dust full photo sensor circuit board/dust full LED circuit board) is replaced.

1) Set the bits 1 to 4 of the DIPSW1001 on the punch controller circuit board as shown below.



2) Press the SW1002 or SW1003 on the punch controller circuit board. Pressing these switches, the sensor output is automatically adjusted.
   - Adjustment is complete when all the LED1001, LED1002 and LED1003 on the punch controller circuit board light up.

3) Turn off all the bits of the DIPSW1001.

5.1.2.3 Registering Number of Punch Holes

The number of punch holes is registered in the IC on the punch controller circuit board so that the finisher recognizes what type of puncher is installed. The registration is needed, when the punch controller circuit board is replaced.

1) Set the bits 1 to 4 of the DIPSW1001 on the punch controller circuit board as shown below.
2) Press the SW1002 on the punch controller circuit board to choose the number of holes.
   - Every time the SW1002 is pressed, the indications below change in order from top to bottom.

Number of Punch Holes	LED 1001	LED 1002	LED 1003
2 holes (Puncher unit •2H)	ON	OFF	OFF
2/3 holes (Puncher unit •2/3H)	ON	ON	OFF
4 holes (Puncher unit •4HF)	OFF	OFF	OFF
4 holes (Puncher unit •4HS)	OFF	OFF	ON

3) Press the SW1003 on the punch controller circuit board twice. Pressing the switch, the number of punch holes is registered in the punch controller circuit board.
   - Press the SW1003 once, and the solid light above changes to blinking light. Press the SW1003 once again, and the blinking light returns to solid light and the registration is complete.

4) Turn off all the bits of the DIPSW1001.

5.1.2.4 Procedure after Replacement of EEP-ROM (IC1002)

1) Turn off power of the connected machine.

2) Set the bits 1 to 4 of the DIPSW1001 on the punch controller circuit board.

3) Press the SW1002 and SW1003 on the punch controller circuit board simultaneously.

- This initializes the EEP-ROM. After the initialization has been completed, the LED1001, LED1002 and LED1003 all light up.

4) Adjust the sensor output and register the number of punch holes.

5.2 Electrical Parts Layout

5.2.1 Finisher/Saddle-Stitcher Unit

5.2.1.1 Sensors, Microswitches and Clutch

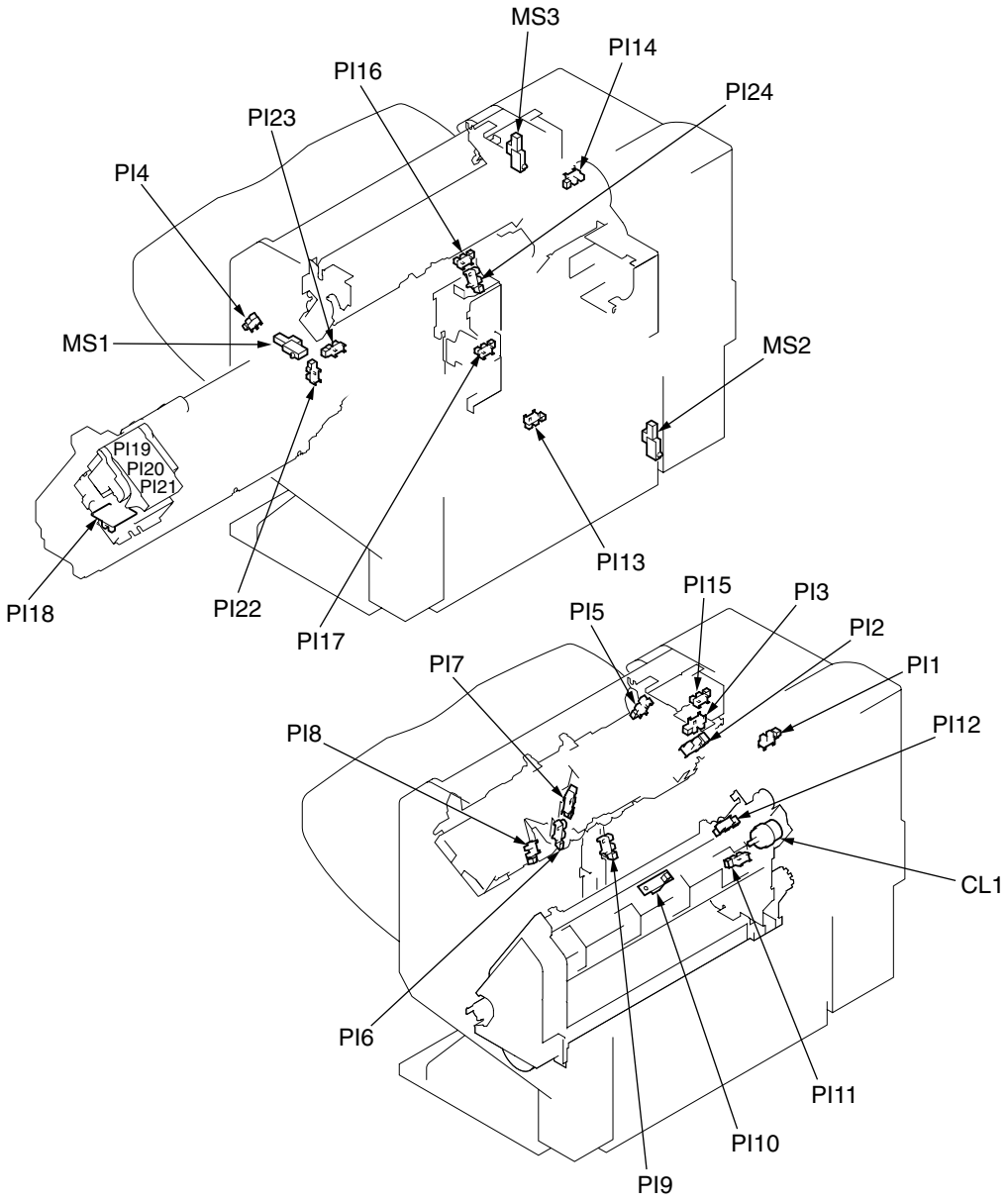


Figure 5-01

Table 5-01

Description	Code	Function
Photo interrupter	PI1	Inlet paper detection
	PI2	Paddle home position detection
	PI3	Multi-sheet roller home position detection
	PI4	Front jog plate home position detection
	PI5	Rear jog plate home position detection
	PI6	Jog tray paper detection
	PI7	Delivery belt home position detection
	PI8	Tray paper detection
	PI9	Paper level detection
	PI10	Fold position detection
	PI11	Folding home position detection
	PI12	Folding roller home position detection
	PI13	Booklet tray paper detection
	PI14	Staple/fold motor clock detection
	PI15	Shift upper limit detection
	PI16	Shift lower limit detection
	PI17	Shift motor clock detection
	PI18	Slide home position detection (in the stapler)
	PI19	Staple drive home position detection (in the stapler)
	PI20	Staple empty detection (in the stapler)
	PI21	Staple top position detection (in the stapler)
	PI22	Front door open detection
	PI23	Top cover open detection
	PI24	Paper full detection
Microswitch	MS1	Front door open detection
	MS2	Joint open detection
	MS3	Staple safety detection
Clutch	CL1	Booklet clutch

5.2.1.2 Motors and Circuit Board

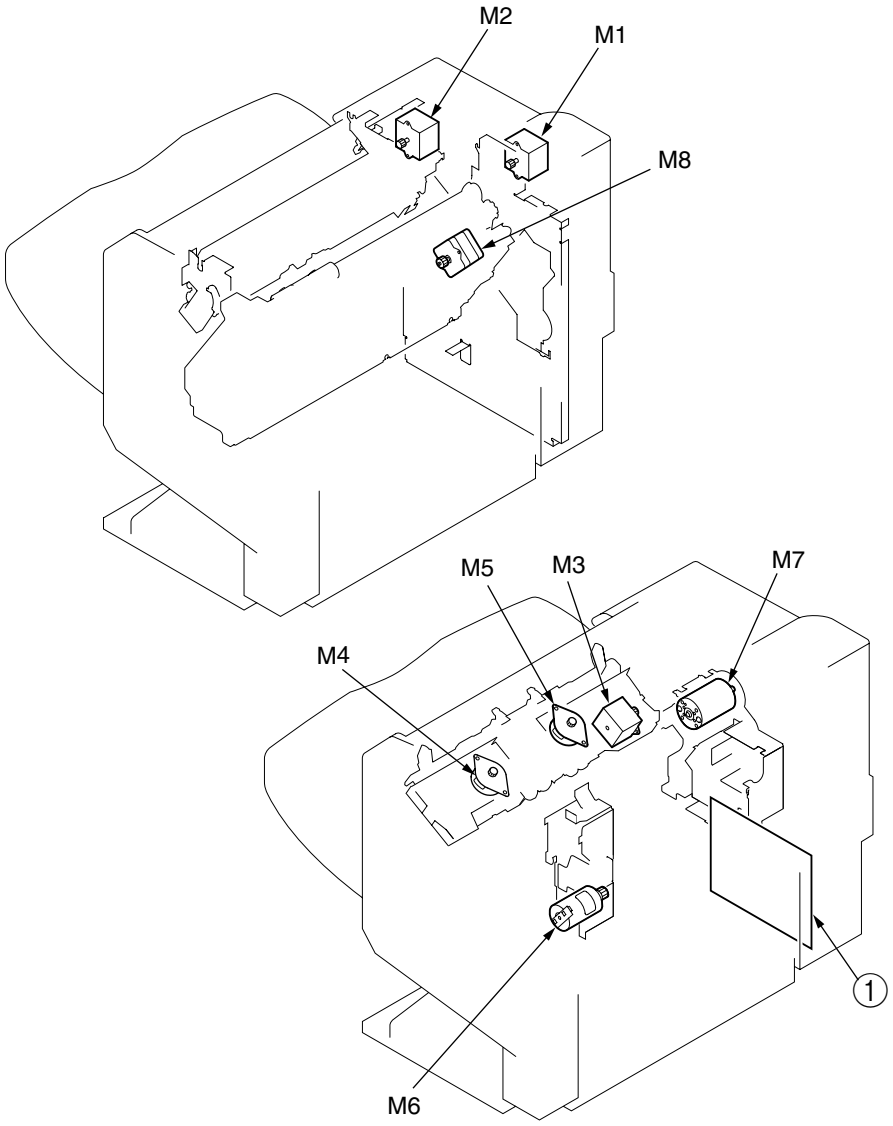


Figure 5-02

Table 5-02

Description	Code	Function
Motor	M1	Feed motor
	M2	Paddle motor
	M3	Delivery motor
	M4	Front jog plate motor
	M5	Rear jog plate motor
	M6	Shift motor
	M7	Staple/fold motor
	M8	Slide motor
Finisher controller circuit board	①	Control of the finisher

5.2.2 Puncher Unit (Optional)

5.2.2.1 Sensors

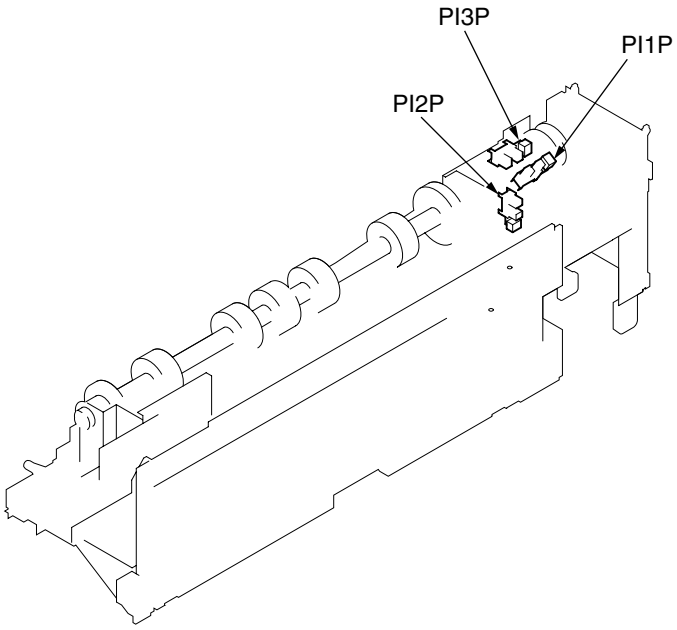


Figure 5-03

Table 5-03

Description	Code	Function
Photo interrupter	PI1P	Punch home position detection
	PI2P	Side registration home position detection
	PI3P	Punch motor clock detection

5.2.2.2 Motors

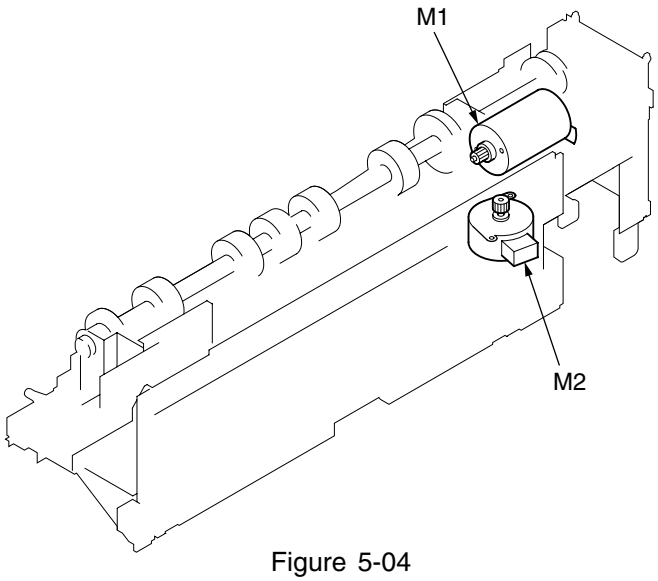


Figure 5-04

Table 5-04

Description	Code	Function
Motor	M1P	Punch motor
	M2P	Side registration motor

5.2.2.3 Circuit Boards

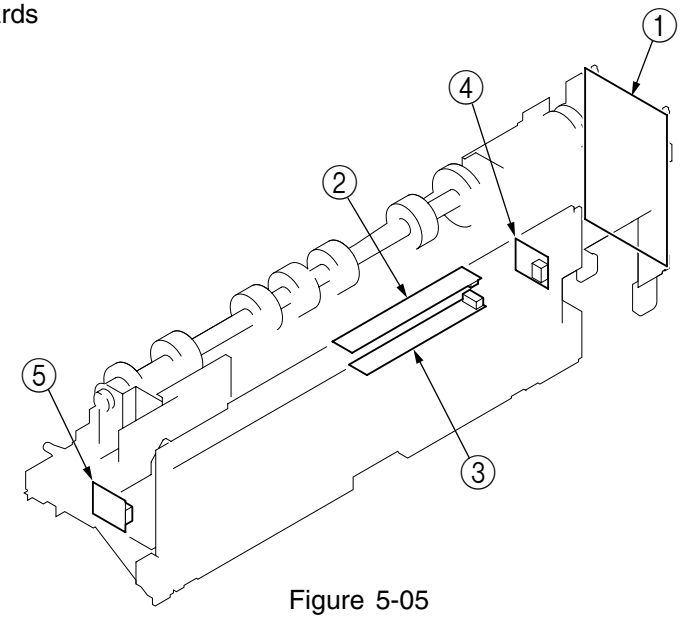


Figure 5-05

Table 5-05

Code	Function
①	Punch controller circuit board
②	Photo sensor circuit board
③	LED circuit board
④	Dust full photo sensor circuit board
⑤	Dust full LED circuit board

5.3 LED/Check Pin List by PCB

This section lists the LEDs and check pins that are necessary for servicing this finisher at a customer's place.

Note!

Check pins not shown on the list must be used at the factory only, as the adjustments and inspections using these pins need special tools or instruments and very high accuracy is required. Never touch these check pins during servicing at a customer's place.

5.3.1 Finisher Controller circuit Board

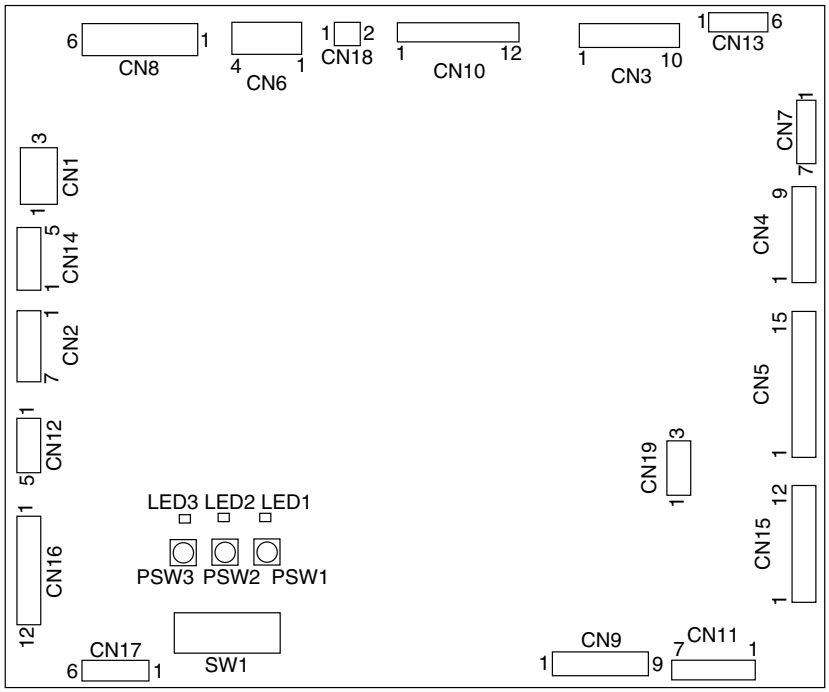


Figure 5-06

Table 5-06

Switch	Function
SW1	Adjustment of fold position/saddle-stitch double stapling
PSW1	Adjustment of fold position/saddle-stitch double stapling
PSW2	Adjustment of fold position/saddle-stitch double stapling
PSW3	Factory mode

5.3.2 Punch Controller Circuit Board

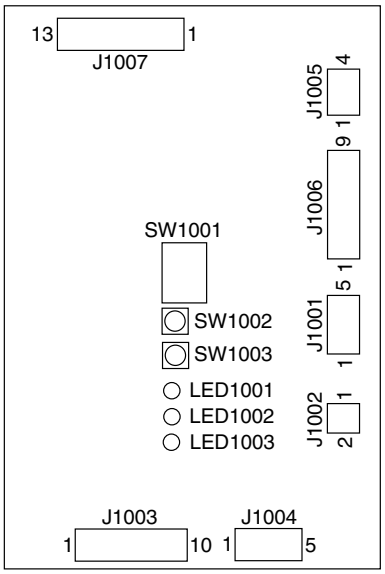


Figure 5-07

Table 5-07

Switch	Function
SW1001	Registration of number of punch holes/adjustment of sensor output
SW1002	Registration of number of punch holes/adjustment of sensor output
SW1003	Registration of number of punch holes/adjustment of sensor output

5.4 Troubleshooting

5.4.1 Troubleshooting Procedure (Finisher/Saddle-Stitcher Unit)

5.4.1.1 186 - Failure in communications with printer

Table 5-08

Finisher controller PCB/Inverter DC controller PCB 1) Is the problem solved when the power switch of the printer is turned off and then on? YES: Completed.
Wiring 2) Is the wiring between the finisher controller circuit board and the inverter DC controller circuit board installed properly? NO: Correct the wiring.
Finisher controller PCB/Inverter DC controller PCB 3) Is the problem solved when the finisher controller circuit board and inverter DC controller circuit board are replaced? YES: Completed.

5.4.1.2 096-09 - Failure of finisher unit backup memory

Table 5-09

Finisher controller PCB 1) Is the problem solved when the power switch of the printer is turned off and then on? YES: Completed. NO: Replace the finisher controller circuit board.

5.4.1.3 096-01 - Feed motor failure

Table 5-10

Multi-sheet feed roller (top) home position sensor (PI12) 1) Check the multi-sheet feed roller (top) home position sensor. Is the sensor working properly? NO: Replace the sensor.
Wiring 2) Is the wiring between the finisher controller circuit board and the feed motor installed properly? NO: Correct the wiring.
Feed roller 3) Rotate the multi-sheet feed roller (top) shaft by hand. Is the multi-sheet feed roller (top) is raised and lowered properly? NO: Adjust the mechanical mechanism.
Feed motor (M1)/Finisher controller PCB 4) Is the problem solved when the feed motor is replaced? YES: Completed. NO: Replace the finisher controller circuit board.

5.4.1.4 096-05 - Delivery motor failure

Table 5-11

Delivery belt home position sensor (PI7) 1) Check the delivery belt home position sensor. Is the sensor working properly? NO: Replace the sensor.
Wiring 2) Is the wiring between the finisher controller circuit board and the delivery motor installed properly? NO: Correct the wiring.
Multi-sheet delivery roller 3) Rotate the multi-sheet delivery roller by hand. Does the roller rotate smoothly? NO: Adjust the mechanical mechanism.
Delivery motor (M3)/Finisher controller PCB 4) Is the problem solved when the delivery motor is replaced? YES: Completed. NO: Replace the finisher controller circuit board.

5.4.1.5 096-03 -Rear jog plate motor failure

Table 5-12

Rear jog plate home position sensor (PI5) 1) Check the rear jog plate home position sensor. Is the sensor working properly? NO: Replace the sensor.
Wiring 2) Is the wiring between the finisher controller circuit board and the rear jog plate motor installed properly? NO: Correct the wiring.
Rear jog plate 3) Is there a hitch in the jog plate travel path? YES: Adjust the mechanical mechanism.
Rear jog plate motor (M5)/Finisher controller circuit board 4) Is the problem solved when the rear jot plate motor is replaced? YES: Completed. NO: Replace the finisher controller circuit board.

5.4.1.6 096-03 - Front jog plate motor failure

Table 5-13

Front jog plate home position sensor (PI4)
1) Check the front jog plate home position sensor. Is the sensor working properly?
NO: Replace the sensor.
Wiring
2) Is the wiring between the finisher controller circuit board and the front jog plate motor installed properly?
NO: Correct the wiring.
Front jog plate
3) Is there a hitch in the jog plate travel path?
YES: Adjust the mechanical mechanism.
Front jog plate motor (M4)/Finisher controller circuit board
4) Is the problem solved when the front jot plate motor is replaced?
YES: Completed.
NO: Replace the finisher controller circuit board.

5.4.1.7 096-04 - Staple/fold motor failure

Table 5-14

Wiring
1) Is the wiring between the finisher controller circuit board and the staple/fold motor installed properly?
NO: Correct the wiring.
Stapler unit
2) Rotate the staple jam removal dial. Is there a hitch in the rotation?
YES: Adjust the mechanical mechanism.
Staple/fold motor (M7)/Finisher controller PCB
3) Is the problem solved when the staple/fold motor is replaced?
YES: Completed.
NO: Replace the finisher controller circuit board.

5.4.1.8 096-04 - Staple/fold motor failure

Table 5-15

Staple/fold clock sensor (PI14)
1) Check the staple/fold clock sensor. Is the sensor working properly?
NO: Replace the sensor.
Finisher control PCB/Stapler unit
2) Does the staple/fold motor operate at the specified timing?
YES: Replace the finisher controller circuit board.
NO: Check the stapler unit drive mechanism and adjust it if there is problem. If not, go to the step 3.
Staple/fold motor (M7)/Finisher controller PCB
3) Is the problem solved when the staple/fold motor is replaced?
YES: Completed.
NO: Replace the finisher controller circuit board.

5.4.1.9 096-04 - Staple/fold motor failure

Table 5-16

Folding home position sensor (PI11)
1) Check the folding home position sensor. Is the sensor working properly?
NO: Replace the sensor.
Wiring
2) Is the wiring between the finisher controller circuit board and the staple/fold motor installed properly?
NO: Correct the wiring.
Saddle-stitcher unit
3) Rotate the fold jam removal dial. Is there a hitch in the rotation?
YES: Adjust the mechanical mechanism.
Staple/fold motor (M7)/Finisher controller PCB
4) Is the problem solved when the staple/fold motor is replaced?
YES: Completed.
NO: Replace the finisher controller circuit board.

5.4.1.10 096-04 - Staple/fold motor failure

Table 5-17

Staple/fold clock sensor (PI14)
1) Check the staple/fold clock sensor. Is the sensor working properly?
NO: Replace the sensor.
Finisher control PCB/Saddle-stitcher unit
2) Does the staple/fold motor operate at the specified timing?
YES: Replace the finisher controller circuit board.
NO: Check the saddle-stitcher unit drive mechanism and adjust it if there is problem. If not, go to the step 3.
Staple/fold motor (M7)/Finisher controller PCB
3) Is the problem solved when the staple/fold motor is replaced?
YES: Completed.
NO: Replace the finisher controller circuit board.

5.4.1.11 096-06 - Slide motor failure

Table 5-18

Slide home position sensor (PI18)
1) Check the slide home position sensor. Is the sensor working properly?
NO: Replace the sensor circuit board.
Wiring
2) Is the wiring between the finisher controller circuit board and the slide motor installed properly?
NO: Correct the wiring.
Stapler unit
3) Is there a hitch in the stapler travel path?
YES: Adjust the mechanical mechanism.
Slide motor (M8)/ Finisher controller circuit board
4) Is the problem solved when the slide motor is replaced?
YES: Completed.
NO: Replace the finisher controller circuit board.

5.4.1.12 096-02 - Shift motor failure

Table 5-19

Paper level sensor (PI9)
1) Check the paper level sensor. Is the sensor working properly?
NO: Replace the sensor.
Tray elevator mechanism
2) Check the tray elevator mechanism. Is the mechanism working properly?
NO: Adjust the mechanism.
Finisher controller PCB
3) Power of 24 VDC is supplied to the shift motor from the finisher controller circuit when the tray is to be driven.
NO: Replace the finisher controller circuit board.
Shift motor (M6)/Wiring
4) Check the wiring between the finisher controller circuit board and the shift motor. Is the wiring installed properly?
YES: Replace the shift motor.
NO: Correct the wiring.

5.4.1.13 096-02 - Shift motor failure

Table 5-20

Tray position
1) Has the tray reached the shift upper limit sensor?
YES: Lower the tray position.
Shift upper limit sensor (PI15)
2) Check the shift upper limit sensor. Is the sensor working properly?
NO: Replace the sensor.
Finisher controller PCB/Wiring
3) Check the wiring between the finisher controller circuit board and the shift upper limit sensor. Is the wiring installed properly?
YES: Replace the finisher controller circuit board.
NO: Correct the wiring.

5.4.1.14 096-02 - Shift motor failure

Table 5-21

—
1) Is the tray raised? YES: Go to the step 4. NO: Go to the step 2.
Finisher controller PCB
2) Power is supplied to the finisher controller circuit board motor when the tray is to be raised or lowered? YES: Go to the step 3. NO: Replace the finisher controller circuit board.
Tray elevator mechanism/Shift motor (M6)
3) Is there problem with the tray elevator mechanism? YES: Adjust the tray elevator mechanism. NO: Replace the tray elevator motor.
Shift motor clock sensor (PI17)/ Finisher controller circuit board
4) Check the shift motor clock sensor. Is the sensor working properly? YES: Replace the finisher controller circuit board. NO: Replace the sensor.

5.4.1.15 096-07 - Paddle motor failure

Table 5-22

Paddle home position sensor (PI2)
1) Check the paddle home position sensor. Is the sensor working properly? NO: Replace the sensor.
Swing guide home position sensor (PI3)
2) Check the swing guide home position sensor. Is the sensor working properly? NO: Replace the sensor.
Wiring
3) Is the wiring between the finisher controller circuit board and the paddle motor installed properly? NO: Correct the wiring.
Paddle/swing guide
4) Rotate the paddle motor forward and backward by hand. Is there a hitch in rotation of the paddle or up/down movement of the swing guide? YES: Adjust the mechanical mechanism.
Paddle motor (M2)/Finisher controller circuit board
5) Is the problem solved when the paddle motor is replaced? YES: Completed. NO: Replace the finisher controller circuit board.

5.4.2 Troubleshooting Procedure (Optional Puncher Unit)

5.4.2.1 096-0C - Failure in communications with puncher

Table 5-23

Finisher controller PCB/Punch controller PCB 1) Is the problem solved when the power switch of the printer is turned off and then on? YES: Completed.
Wiring 2) Is the wiring between the finisher controller circuit board and the punch controller circuit board installed properly? NO: Correct the wiring.
Power supply 3) Measure the voltage between CN14-5(+) and CN14-3(-) on the finisher controller circuit board. Is it 24 VDC? NO: Replace the finisher controller circuit board. YES: Replace the punch controller circuit board.

5.4.2.2 096-0E - Failure of puncher unit backup memory

Table 5-24

EEP-ROM (IC1002) 1) Is the problem solved when the EEP-ROM on the punch controller circuit board is initialized? YES: Completed.
Punch controller PCB 2) Is the problem solved when the power switch of the printer is turned off and then on? YES: Completed. NO: Replace the punch controller circuit board.

5.4.2.3 096-0D - Puncher unit power supply failure

Table 5-25

Finisher controller PCB/Connected machine DC controller PCB 1) Is the problem solved when the power switch of the printer is turned off and then on? YES: Completed.
Wiring 2) Is the wiring between the finisher controller circuit board and the punch controller circuit board installed properly? NO: Correct the wiring.
Power supply 3) Measure the voltage between CN14-5(+) and CN14-3(-) on the finisher controller circuit board. Is it 24 VDC? YES: Replace the punch controller circuit board. NO: Replace the finisher controller circuit board.

5.4.2.4 096-0A - Punch motor failure

Table 5-26

Punch home position sensor (PI1P)
1) Check the punch home position sensor. Is the sensor working properly?
NO: Replace the sensor.
Punch motor clock sensor (PI3P)
2) Check the punch motor clock sensor. Is the sensor working properly?
NO: Replace the sensor.
Wiring
3) Is the wiring between the finisher controller circuit board and the sensors installed properly?
NO: Correct the wiring.
Punch mechanism/Punch motor (M1P)
4) Is there problem with the punch mechanism?
YES: Adjust the punch mechanism.
NO: Replace the punch motor.
Punch controller PCB/Finisher controller PCB
5) Is the problem solved when the punch controller circuit board is replaced?
YES: Completed.
NO: Replace the finisher controller circuit board.

5.4.2.5 096-0F, 096-10 - Punch sensor (side registration) failure

Table 5-27

Side registration sensor (photo sensor PCB/LED PCB)
1) Check the side registration sensor. Is the sensor working properly?
NO: Replace the sensor.
Wiring
2) Is the wiring between the punch controller circuit board and the side registration sensor installed properly?
NO: Correct the wiring.
Punch controller PCB/Finisher controller PCB
3) Is the problem solved when the punch controller circuit board is replaced?
YES: Completed.
NO: Replace the finisher controller circuit board.

5.4.2.6 096-11 - Punch sensor (dust full) failure

Table 5-28

Dust full sensor (Dust full photo sensor PCB/Dust full LED PCB)
1) Check the dust full sensor. Is the sensor working properly?
NO: Replace the sensor.
Wiring
2) Is the wiring between the punch controller circuit board and the dust full sensor installed properly?
NO: Correct the wiring.
Punch controller PCB/Finisher controller PCB
3) Is the problem solved when the punch controller circuit board is replaced?
YES: Completed.
NO: Replace the finisher controller circuit board.

5.4.2.7 096-0B - Side registration motor failure

Table 5-29

Side registration home position sensor (PI2P)
1) Check the side registration home position sensor. Is the sensor working properly?
NO: Replace the sensor.
Wiring
2) Is the wiring between the finisher controller circuit board and the side registration home position sensor installed properly?
NO: Correct the wiring.
Side registration mechanism/Side registration motor (M2P)
3) Is there problem with the side registration mechanism?
YES: Adjust the side registration mechanism.
NO: Replace the side registration motor.
Punch controller PCB/Finisher controller PCB
4) Is the problem solved when the punch controller circuit board is replaced?
YES: Completed.
NO: Replace the finisher controller circuit board.

5.5 Self-Diagnosis

5.5.1 Overview

This finisher has the self-diagnosis function for examining the state of the machine using the CPU on the finisher controller circuit board. The finisher performs the self-diagnosis as necessary. If it detects a problem, the finisher transmits the “code” and the “detail code” of the problem to the printer. The printer displays the code on the operating unit. The detail code is viewed in the service mode of the printer.

5.5.2 Error

5.5.2.1 Finisher/Saddle-Stitcher Unit

Table 5-30 (1/2)

CU error code	Error	Detection Timing
186	Interface error	• Communications is cut off between the printer and the finisher. This error is detected by the printer.
096-09	Backup RAM data error	• There is an error in the checksum of the finisher controller circuit board when power is turned on.
096-01	Paper eject motor error	• The feed motor has run for 2 seconds but the multi-sheet feed roller (top) hasn't left the multi-sheet feed roller (top) home position sensor.
		• The feed motor has run for 2 seconds but the multi-sheet feed roller (top) hasn't returned to the multi-sheet feed roller (top) home position sensor.
096-05	Batch processing motor error	• The delivery motor has run for 3 seconds but the delivery belt hasn't left the delivery belt home position sensor.
		• If the paper-ejection belt does not return to the paper-ejection-belt home-position sensor within 1.1 seconds after the paper-ejection motor has started
096-03	Aligning motor error	• If alignment-motor errors are detected in the front-alignment and rear-alignment motors.
096-04	Staple motor (stapling/folding) error	• If the stapler does not move away from the staple home-position sensor within approximately 0.6 seconds after the staple/folding motors have started.
		• If the stapler does not return to the staple home-position sensor within approximately 0.6 seconds after the staple/folding motors have started.
		• The staple/fold motor is running but the staple/fold clock sensor hasn't detected a clock signal more than 0.1 seconds.
		• If the folding roller does not move away from the folding home-position sensor within approximately 0.7 seconds after the staple/folding motors have started.
		• If the folding roller does not return to the folding home-position sensor within approximately 10 seconds after the staple/folding motors have started the first time, within approximately 4 seconds after they have started the second time, and within approximately 19 seconds after initialization.
		• If the clock is interrupted for 0.1 seconds or more while the staple/folding motors are operating.

Table 5-30 (2/2)

CU error code	Error	Detection Timing
096-06	Stapler unit feed motor error	• The slide motor has run for 1 second but the stapler unit hasn't left the slide home position sensor.
		• The slide motor has run for 6 seconds but the stapler unit hasn't returned to the slide home position sensor
096-02	Tray raising/lowering motor error	• More than 10 seconds have passed after the shift motor began to run but no change has occurred in the paper level sensor.
		• The shift upper limit sensor is turned on while the tray is ascending.
		• The shift motor is running but the shift motor clock sensor hasn't detected a clock signal more than 50 msec.
096-07	Paddle motor error	• The paddle motor has run for 2 seconds but the paddle hasn't left the paddle home position sensor.
		• The paddle motor has run for 2 seconds but the paddle hasn't returned to the paddle home position sensor.
		• The paddle motor has run for 2 seconds but the swing guide hasn't left the swing guide home position sensor.
		• The paddle motor has run for 2 seconds but the swing guide hasn't returned to the swing guide home position sensor.
096-08	Folding sensor error	

5.2.2.2 Puncher Unit (Option)

Table 5-31

CU error code	Error	Detection Timing
096-0C	Punch interface error	• Communications with the puncher is cut off.
096-0E	Punch backup RAM data error	• There is an error in the checksum of the punch controller circuit board when power is turned on.
096-0D	Punch power failure error	• Power of 24 VDC is not supplied from the finisher unit but the puncher has received the start signal.
096-0A	Punch motor error	• The punch motor has run for 250 msec. but the puncher hasn't returned to the punch motor home position sensor.
		• The punch motor is running but the punch motor clock sensor hasn't detected a clock signal more than 60 msec.
096-0F	Punch resist sensor error	• During automatic sensor output adjustment, the light emitting voltage is set to 4.4 V but the light receiving voltage doesn't exceed 2.5 V.
		• During automatic sensor output adjustment, the light emitting voltage is set to 0 V but the light receiving voltage exceeds 2.5 V.
		• After automatic sensor output adjustment, the light emitting voltage setting is higher than 4.4 V.
096-10	Punch horizontal resist sensor error	• During automatic sensor output adjustment, the light emitting voltage is set to 4.4 V but the light receiving voltage doesn't exceed 2.5 V.
		• During automatic sensor output adjustment, the light emitting voltage is set to 0 V but the light receiving voltage exceeds 2.5 V.
		• After automatic sensor output adjustment, the light emitting voltage setting is higher than 4.4 V.
096-11	Punch debris sensor error	• During automatic sensor output adjustment, the light emitting voltage is set to 4.4 V but the light receiving voltage doesn't exceed 2.5 V.
		• During automatic sensor output adjustment, the light emitting voltage is set to 0 V but the light receiving voltage exceeds 2.5 V.
		• After automatic sensor output adjustment, the light emitting voltage setting is higher than 4.4 V.
096-0B	Punch feed motor error	• The side registration motor has run for 1000 msec. but the puncher hasn't left the side registration home position sensor.
		• The side registration motor has run for 1000 msec. but the puncher hasn't returned to the side registration home position sensor.

5.5.3 Alarm

5.5.3.1 Finisher/Saddle-Stitcher Unit

Table 5-32

Error	Alarm Condition	Detection Timing	Mechanism Operation	Reset
No staple	The staple cartridge becomes empty.	Always monitored.	The operation can be continued, although that depends on command from the printer.	Replace the staple cartridge or set it properly.
Over-stacking on outlet tray	The number of documents on the output tray exceeds the stackable number of sheets/ sets.	When documents exceeding the limit have been output.	The operation can be continued.	Remove the documents on the output tray.
Over-stacking on booklet tray	The number of document sets on the booklet tray exceeds 10 sets.	When documents sets exceeding the limit have been output.	The operation can be continued.	Remove the documents on the booklet tray.

5.5.3.2 Puncher Unit (Optional)

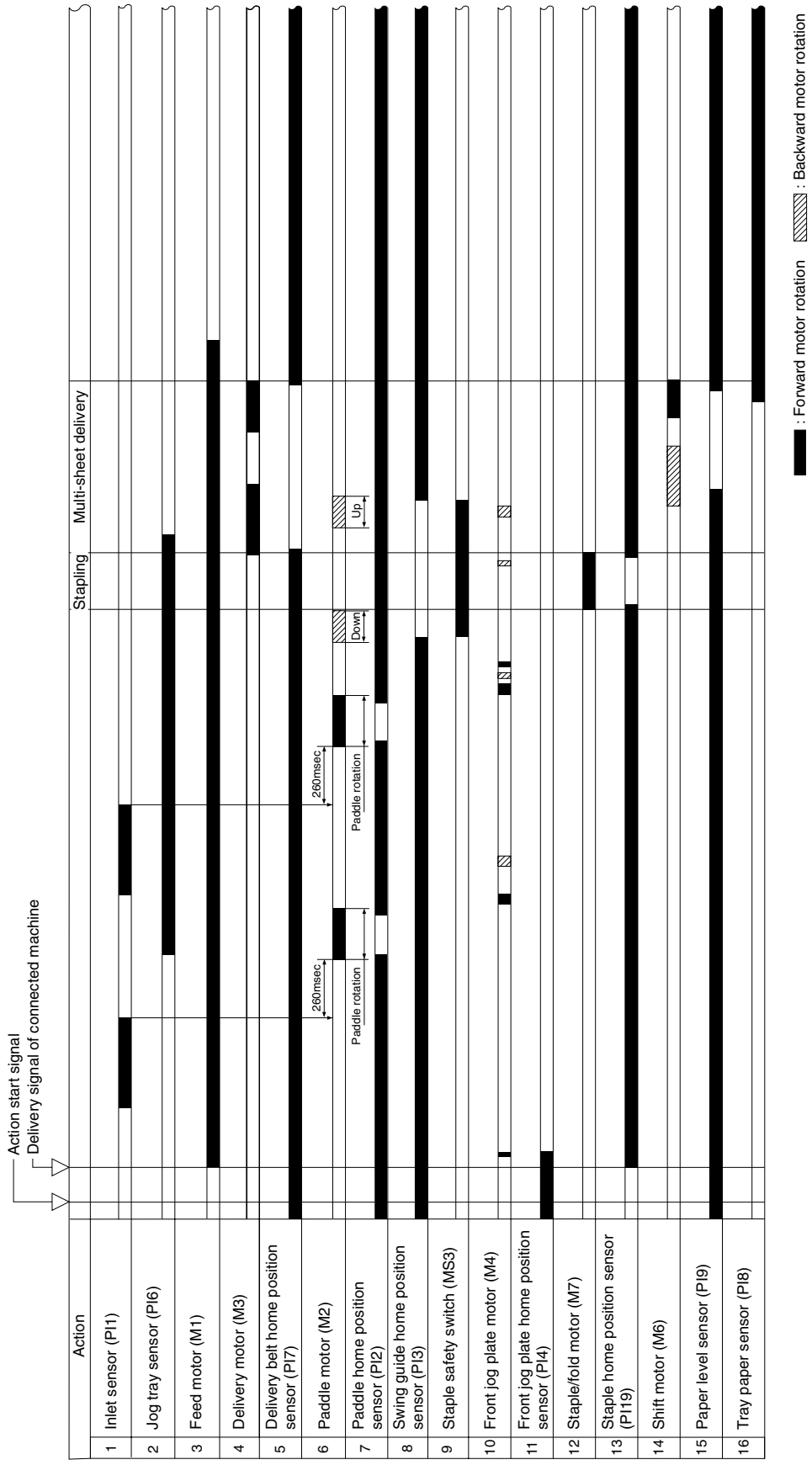
Table 5-33

Error	Alarm Condition	Detection Timing	Mechanism Operation	Reset
Punch dust full	The punch dust accumulation has reached the limit for the receptacle.	During punching	The operation can be continued.	Remove the punch dust.

APPENDIX A OVERALL TIMING CHART

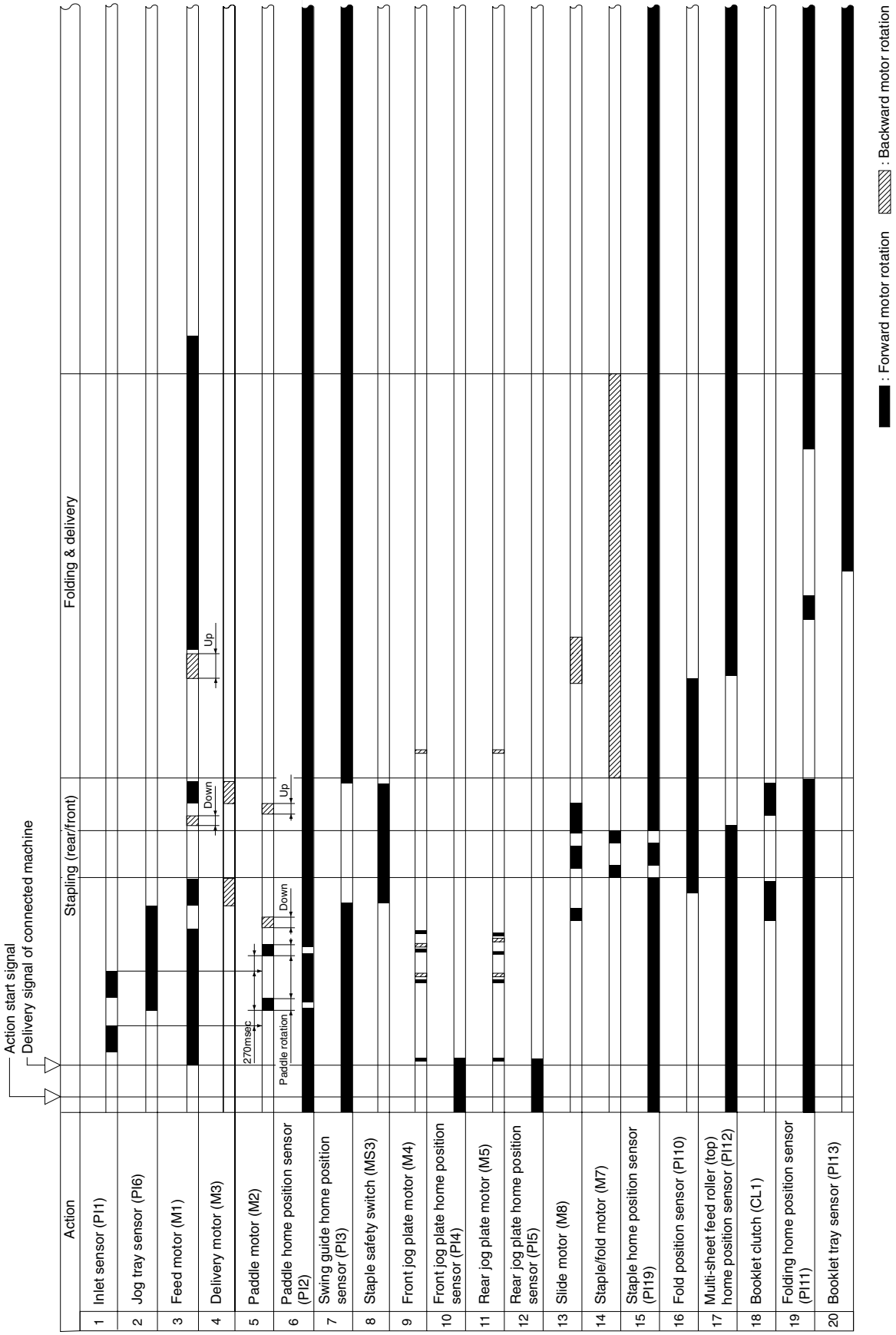
1. Finisher Unit

Staple-A4, Two-Sheet Rear Single Stapling


Action start signal
Delivery signal of connected machine
Action
Stapling
Multi-sheet delivery
1 Inlet sensor (PI1)
2 Jog tray sensor (PI6)
3 Feed motor (M1)
4 Delivery motor (M3)
5 Delivery belt home position sensor (PI7)
6 Paddle motor (M2)
7 Paddle home position sensor (PI2)
8 Swing guide home position sensor (PI3)
9 Staple safety switch (MS3)
10 Front jog plate motor (M4)
11 Front jog plate home position sensor (PI4)
12 Staple/fold motor (M7)
13 Staple home position sensor (PI19)
14 Shift motor (M6)
15 Paper level sensor (PI9)
16 Tray paper sensor (PI8)
260msec
Paddle rotation
Down
Up
: Forward motor rotation
: Backward motor rotation

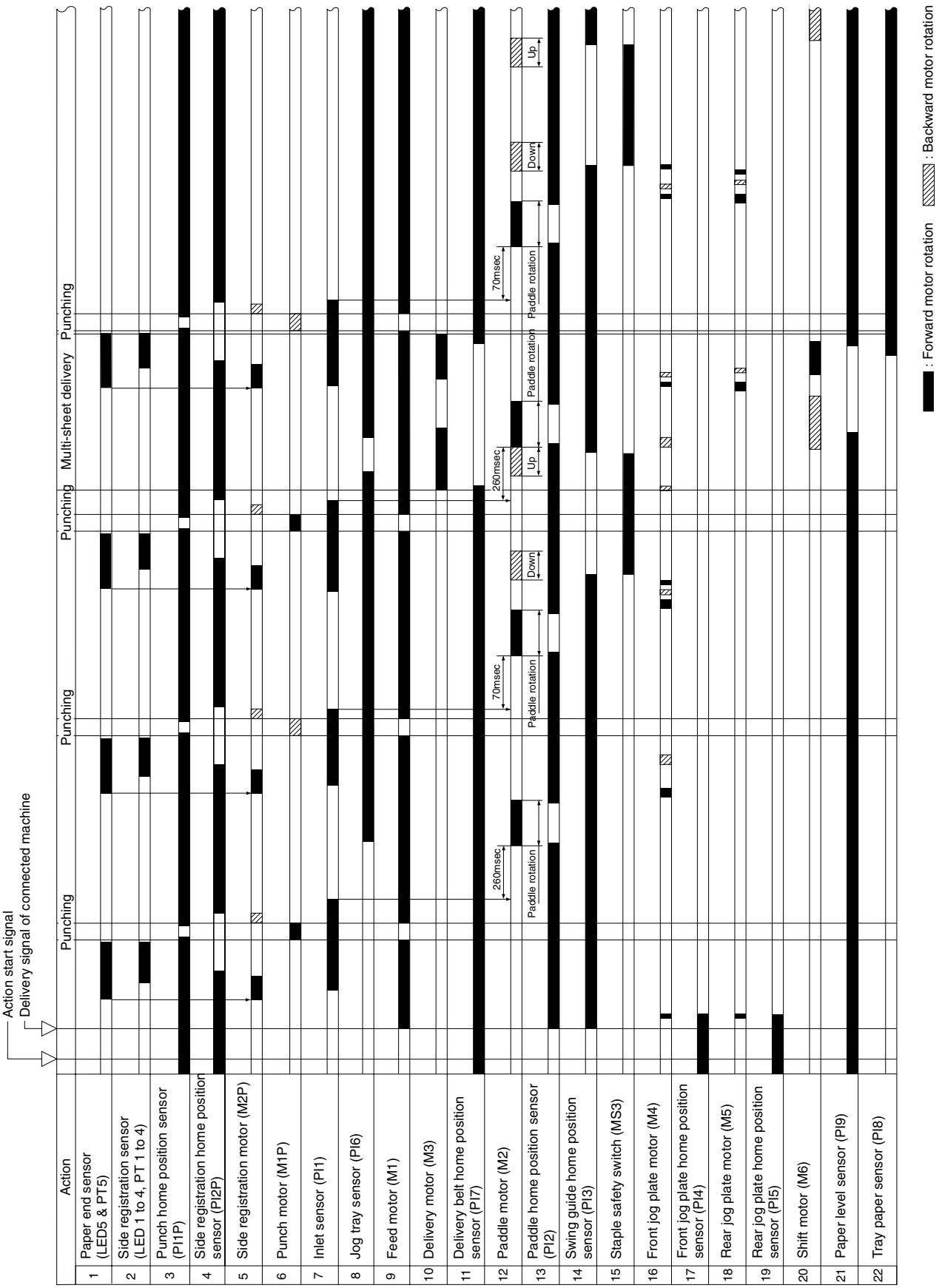
2. Saddle-Stitcher Unit

Booklet-LTR, Two Sheets One Set


Action start signal
Delivery signal of connected machine
Stapling (rear/front)
Folding & delivery
Action
1 Inlet sensor (PI1)
2 Jog tray sensor (PI6)
3 Feed motor (M1)
4 Delivery motor (M3)
5 Paddle motor (M2)
6 Paddle home position sensor (PI2)
7 Swing guide home position sensor (PI3)
8 Staple safety switch (MS3)
9 Front jog plate motor (M4)
10 Front jog plate home position sensor (PI4)
11 Rear jog plate motor (M5)
12 Rear jog plate home position sensor (PI5)
13 Slide motor (M8)
14 Staple/fold motor (M7)
15 Staple home position sensor (PI19)
16 Fold position sensor (PI10)
17 Multi-sheet feed roller (top) home position sensor (PI12)
18 Booklet clutch (CL1)
19 Folding home position sensor (PI11)
20 Booklet tray sensor (PI13)
270msec
Paddle rotation
Down
Up
Down
Up
: Forward motor rotation
: Backward motor rotation

3. Puncher Unit (Optional)

Punch-A4, Two-Sheet Two Sets, Job Offset


Action start signal
Delivery signal of connected machine
Action
Punching
Punching
Punching
Multi-sheet delivery
Punching
1 Paper end sensor (LED5 & PT5)
2 Side registration sensor (LED 1 to 4, PT 1 to 4)
3 Punch home position sensor (PI1P)
4 Side registration home position sensor (PI2P)
5 Side registration motor (M2P)
6 Punch motor (M1P)
7 Inlet sensor (PI1)
8 Jog tray sensor (PI6)
9 Feed motor (M1)
10 Delivery motor (M3)
11 Delivery belt home position sensor (PI7)
12 Paddle motor (M2)
13 Paddle home position sensor (PI2)
14 Swing guide home position sensor (PI3)
15 Staple safety switch (MS3)
16 Front jog plate motor (M4)
17 Front jog plate home position sensor (PI4)
18 Rear jog plate motor (M5)
19 Rear jog plate home position sensor (PI5)
20 Shift motor (M6)
21 Paper level sensor (PI9)
22 Tray paper sensor (PI8)
260msec
Paddle rotation
70msec
Down
Up
: Forward motor rotation
: Backward motor rotation

APPENDIX B SIGNAL NAME/ABBREVIATION LIST

The list below shows the signal names and their abbreviations used in this chapter and the circuit diagrams.

Reference: The abbreviations enclosed in brackets are analog electric signals that cannot be expressed by “1” or “0.” All others are digital signals expressed by “1” or “0.”

1. Finisher/Saddle-Stitcher Unit

ADJ_TRAY_S	JOG TRAY PAPER DETECT Signal
B_CLU	BIND CLUTCH DRIVE Signal
BDL_ROL_HP	SWING GUIDE HP DETECT Signal
BIND_CLK	STAPLE/FOLD MOTOR CLOCK DETECT Signal
BIND_EMPS	BIND TRAY PAPER DETECT Signal
BIND_HP	FOLDING HP DETECT Signal
BIND_L	FOLD POSITION LED ON Signal
BINDMTR	STAPLE/FOLD MOTOR DRIVE Signal
BIND_P	FOLD POSITION PAPER DETECT Signal
BIND_ROL_HP	BUNDLE FEED ROLLER HP DETECT Signal
EJCT_BLT_HP	EJECT BELT HP DETECT Signal
EJCTMTR	EJECT MOTOR DRIVE Signal
ENT_S	INLET PAPER DETECT Signal
FDOOR_S	FRONT DOOR OPEN DETECT Signal
FEEDMTR	FEED MOTOR DRIVE Signal
FJOG_HP	FRONT JOG PLATE HP DETECT Signal
FJOGMTR	FRONT JOG MOTOR DRIVE Signal
FRONT_SW	FRONT DOOR SWITCH Signal
HOOK_S	HOOK EMPTY DETECT Signal
JOINT_SW	JOINT SWITCH Signal
LVL_S	PAPER SURFACE DETECT Signal
PAPER_F	PAPER FULL DETECT Signal
PDL_HP	PADDLE HP DETECT Signal
PDLMTR	PADDLE MOTOR DRIVE Signal
RJOG_HP	REAR JOG PLATE HP DETECT Signal
RJOGMTR	REAR JOG MOTOR DRIVE Signal
SELF_P	HOOK TOP POSITION DETECT Signal
SEN	INVERTER DISCHARGE SENSOR
SIFT_CLK	SIFT MOTOR CLOCK DETECT Signal
SIFT_DNLMT	SIFT DOWN LIMIT DETECT Signal
SIFTMTR	SIFT MOTOR DRIVE Signal
SIFT_UPLMT	SIFT UPPER LIMIT DETECT Signal
SLID_HP	SLIDE HP DETECT Signal
SLIDMTR	SLIDE MOTOR DRIVE Signal
STPL_CNCT	STAPLER CONNECT DETECT Signal
STPL_HP	STAPLE HP DETECT Signal
STPLSAFE_SW	STAPLE SAFETY SWITCH Signal
TOPCOV_S	TOP COVER OPEN DETECT Signal
TRY_EMPS	TRAY PAPER DETECT Signal

2. Puncher Unit (Optional)

CLOCK	PUNCH MOTOR CLOCK DETECT Signal
DUSTLED	DUST LED ON Signal
DUSTPTR	DUST FULL DETECT Signal
PAEND	PAPER END DETECT Signal
PUNCH	PUNCH HP DETECT Signal
SLIDE	SIDE REGISTRATION HP DETECT Signal
SREG1	SIDE REGISTRATION DETECT Signal 1
SREG2	SIDE REGISTRATION DETECT Signal 2
SREG3	SIDE REGISTRATION DETECT Signal 3
SREG4	SIDE REGISTRATION DETECT Signal 4
LEDON1	LED1 ON Signal
LEDON2	LED2 ON Signal
LEDON3	LED3 ON Signal
LEDON4	LED4 ON Signal
LEDON5	LED5 ON Signal

APPENDIX C JAM CODE/STACK PAPER CODE LIST

Jam code list

No.	Jam Code	Indication
1	596	Staple Jam
2	592, 593, 594	Residual Paper Jam
3	595	Door Open Jam
4	590	Paper Delay Jam at Inlet Sensor
5	597	Paper Delay Jam at Fold Position Sensor
6	591	Paper Stopped Jam at Inlet Sensor
7	598	Paper Stopped Jam at Fold Position Sensor
8	599	Sets of Paper Jam

Stack paper code list

No.	Operation panel code	Paper position
1	643	Feeding part
2	644	Post-processing part
3	645	Sets of paper part
4	646	Folding part

APPENDIX D SOLVENTS/OILS LIST

No.	Name	Application	Ingredient	Remark
1	BUCLEAN C-17	Cleaning Ex.) Glass Plastics Rubbers External covers	Fluorine hydrocarbon Alcohols Surfactant Water	• Keep from flame. • Substitute IPA (isopropyl alcohol)
2	Lubricating oil	Driving part Sliding part Lead cam	Silicon oil	• PERMALVE G2 (Nihon Koyu Co., Ltd.)